HORTICULTURAL ABSTRACTS

Vol. XXI December 1951 No. 4

Initialled abstracts and reviews not by Bureau staff are by H. B. S. Montgomery, S. C. Pearce, A. F. Posnette and A. P. Preston of the East Malling Research Station, B. D. Bolas, stationed at East Malling, of the Imperial College of Science, K. S. Dodds of the Commonwealth Potato Collection, Cambridge, J. Hardy of the N.A.A.S., K. Lewis of the Commonwealth Bureau of Pastures and Field Crops, Aberystwyth, R. H. Stoughton of Reading University, V. S. Summerhayes of the Royal Botanic Gardens, Kew, B. S. Furneaux, C. W. S. Hartley and G. St.C. Feilden.

INDEX OF CONTENTS.

Total Abstracts 994. Noted 238.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

(*See also* 3228p, 3229d, 3275.)

3145. SLATER, SIR W.
The organization of agricultural research in Great Britain.
J. Sci. Food Agric., 1951, **2**: 337-41.

The secretary of the Agricultural Research Council [A.R.C.] discusses research in Great Britain and the all-important part played therein by his organization. He shows how the choice of essential problems is based on accurate information afforded by the research workers in conjunction with the advisory officer. One of the functions of the A.R.C. is to weigh the relative importance of such problems in the light of economic trends and surveys of work in progress, and, by means of expert conferences and committees, to see that the attention of the decentralized research institutes and university departments is properly focused on them. The research institutes may be regarded as the main forces in the battle for knowledge in agricultural science, behind them is the A.R.C. with strategic reserves.

3146. ROYAL SOCIETY.
References in abstracting.
[*Publ.*] *roy. Soc., Burlington House, London*, 1951, pp. 4.

Based on examination of more than 100 British abstracting journals, the system presented here by the Abstracting Services Consultative Committee is offered in the hope that it may be of value to those who have to quote references. [It is, as its sponsors point out, extremely close to that observed by many of us and consideration will be given to the possibility of adopting it in its entirety in *Horticultural Abstracts* in the near future. We imagine few of our readers would be inconvenienced.]

3147. ROYAL SOCIETY, SYMBOLS COMMITTEE.
Symbols, signs and abbreviations recommended for British scientific publications.
[*Publ.*] *roy. Soc., Burlington House, London*, 1951, pp. 19, 9d.

In this report the Committee recommends the adoption of certain general principles generally approved at international level. These cover alphabets and founts. They also recommend specific usage of particular symbols to denote physical quantities, symbols to denote mathematical operations and constants. Further they list abbreviations for the names of internationally accepted units, for common British units, e.g. gallon =gal., grain =gr., and for some other words in frequent use, e.g. specific gravity =sp.gr., infra-red =i.r. They also give an alphabetical index of symbols for physical

quantities and of single letters denoting mathematical operations.

3148. North of Scotland College of Agriculture.
Guide to experiments and demonstrations on the Duthie-Craibstone Farm [and other centres].
[*Publ.*] *N. Scot. Coll. Agric.*, 1951, pp. 90, illus.

The trials include variety trials with top fruit, bush fruit and vegetables on the Craibstone Estate, potato variety trials and experiments on the time of planting sprouted and unsprouted potatoes at the Duthie-Craibstone Farm, and black currant and strawberry variety trials at the Aldroughty Farm.

3149. Oldén, E. J.
Studieresa till England. **(A pomological study tour in England.)**
Sver. pomol. Fören. Årsskr., 1950, **51**: 131-54, illus.
Primost, E.
Bericht über den Stand der Obstbauforschung an der Versuchsstation East Malling (England). **(Report on pomological research at East Malling.)**
Bodenkultur, 1950, **4**: 514-17.

An account is given of a visit made to East Malling Research Station by a group of young European pomologists of many nations in March 1950. The many activities seen are noted in both these articles.

3150. Studitskij, A. N.
Mičurinovo učení o vývoji organismů. **(Mičurin's teaching on the development of organisms.)**
Mičurinova Knihovna **2**, Bràzda, Praha 1950, pp. 50, bibl. numerous.

This booklet, which is a Czech translation of the Russian original, once more lauds the achievements of Mičurin and deals with "Mendelism-Morganism-Weismannism" in the accustomed manner. A so-called "Soviet creative Darwinism" is mentioned in it, from which it would appear that the true exponents of Darwinism are Mičurin and Lysenko.

3151. Wrigley, P. I.
Woodland as a farm enterprise.
Bull. Pa agric. Exp. Stat. **536**, 1951, pp. 36, bibl. 10, and *Bull.* **536P**, 1951, pp. 3.

Bulletin 536P presents only the practical useful conclusions contained in *Bulletin* 536. The author pleads for the intelligent use by the farmer of his woodland possibilities, pointing out both the advantages and difficulties inherent in their exploitation in Pennsylvania.

3152. Werfft, R.
Über die Lebensdauer der Pollenkörner in der freien Atmosphäre. **(The longevity of pollen grains in the open.)**
Biol. Zbl., 1951, **70**: 354-67, bibl. 27.

(1) Dry, dark storage at room temperature did not affect the germination of pollen grains of certain species —e.g. *Adonis vernalis*, *Tulipa* spp., *Pirus communis*, *Betula pendula*, *Pinus montana* and *Antirrhinum majus*— for 20-48 days. In other species, however—e.g. *Sambucus niger* and *Digitalis purpurea*—germination was reduced after 7-8 days. (2) The germination of pollen of all species was more or less impaired by 8 hours' exposure to solar radiation. With *Carpinus betulus*, *Deutzia scabra* and *Digitalis purpurea*, for instance, over 90% of the pollen grains lost their germination capacity, while only 30–40% of *Eschscholtzia californica* and *Antirrhinum majus* pollen was affected by such treatment. (3) The susceptibility of the pollen to exposure to the sun was found to increase with age, as trials with *Trollius* pollen showed. (4) From experiments with ultra-violet light it is concluded that the action of the sun on the pollen is due to ultra-violet rays. (5) There was no difference in susceptibility between pollen of shade and of other plants.—Göttingen University.

Statistical design.

(*See also* 3228o, 4087, 4140.)

3153. Nisson, Ø.
The use of systematic 5×5 squares.
Biometrics, 1951, **7**: 167-70, bibl. 5.

It is pointed out that the bias of a systematic Latin square can be allowed for in the statistical analysis. It is argued that in a series of experiments this bias can be used to improve accuracy. S.C.P.

3154. Patterson, H. D.
The analysis of change-over trials.
J. agric. Sci., 1950, **40**: 375-9.

With some treatments the residual effect is no less important than the direct effect, and this has led research workers in dairying to evolve experimental designs permitting the examination of both. A discussion of the statistical analysis of such trials is here given. [The technique could well be applied to trials with perennial plants, where similar problems arise with operations such as pruning and manuring.]
S.C.P.

Biochemistry.

(*See also* 3229e, l.)

3155. Rouir, E. V.
La spectrographie d'émission en agronomie. **(Emission spectroscopy in agricultural research.)** [Dutch, German and English summaries ¼ p. each.]
Bull. Inst. agron. Gembloux, 1950, **18**: 3/4: 133-58, bibl. 27+413.

A short account of the scope of the various techniques employed is followed by a bibliography of 413 references on the use of spectral analysis in agricultural research since 1925.

3156. Budnickaja, E. V., and Ovčarov, K. E.
The application of a staining reaction on carotinoids. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **74**: 779-80, bibl. 10.

A staining method to indicate the presence of carotinoids (as used by Carr and Price, *Biochem. J.*, 20: 497) was applied to various organs of wild rose, begonia, rape, camomile, buttercup, lily, kok-saghyz, krym-saghyz, tomato, carrot, and pumpkin, and the results recorded.

3157. Nicholas, D. J. D., and Fisher, D. J.
A note on the use of tetramethyldiaminodiphenylmethane for determining small amounts of manganese in plants.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 115-20, bibl. 11.

1. A sensitive method is described for determining small amounts of Mn in acid digests of plants with tetramethyldiaminodiphenylmethane or " tetrabase ". 2. The blue colour of the test solution which was developed in an icebath was determined by means of either the D.G. spectrophotometer (wavelength mμ 520) or absorptiometers (red filters) exactly 4 min. after adding the reagents. The effective range is from 0·1 to 0·4 μg Mn. 3. Under condition of test the " tetrabase " is specific for Mn. Duplicate analyses and recovery of added Mn were within the limits of experimental error. 4. A comparison between the results of the " tetrabase " and periodate methods for a range of plant digests showed close agreement. The " t " test showed no significant differences between the results of the two methods whether determined by absorptiometers or the D.G. spectrophotometer. 5. The specificity, sensitivity and ease of determining low levels of Mn by " tetrabase " makes it preferable to the periodate or formaldoxime methods for routine use. [Authors' summary.]

3158. Young, H. Y., and Gill, R. F.
Determination of magnesium in plant tissue with thiazole yellow.
Analyt. Chem., 1951, **23**: 751-4, bibl. 9.

A reliable procedure, suitable for determining very small quantities of magnesium, is described which utilized the colour reaction of magnesium with thiazole yellow under alkaline conditions. The colour was stabilized with polyvinyl alcohol, and interferences were eliminated or compensated for by the addition of hydroxylamine, copper, aluminium, calcium, manganese and phosphate. The method showed increased sensitivity and reproducibility over other similar methods.—Pineapple Res. Inst., Hawaii.

3159. Smith, B. P., and Williams, H. H.
Transaminase studies in germinating seeds.
Arch. Biochem., 1951, **31**: 366-74, bibl. 14.

The results indicated that no definite relationships existed between the changes in glutamic-alanine or glutamic-aspartic transaminase activity and the formation of protein. This would suggest that in plants protein synthesis is not a direct function of transaminase activity; it may play an indirect role in protein synthesis by its action on the interconversion of amino and keto acids. [From authors' summary.] Bean, pea, squash and pumpkin were among the plants studied.—Cornell Univ., Ithaca, N.Y.

3160. Whatley, F. R., Ordin, L., and Arnon, D. I.
Distribution of micronutrient metals in leaves and chloroplast fragments.
Plant Physiol., 1951, **26**: 414-18, bibl. 19.

The Fe, Cu, Mn, Zn, Mo and chlorophyll content of leaves and isolated chloroplast fragments of sugar beets and chards were determined. Fe and Cu were found to be concentrated in the chloroplasts.—Univ. Calif., Berkeley.

3161. Černenko, E. S.
The chlorophyll content of leaves of apple and cabbage varieties of different ripening periods. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 401-4, bibl. 9.

In early varieties of apple and cabbage the chlorophyll content of the leaves was less than that in late varieties.

3162. Schwanitz, F.
Untersuchungen an polyploiden Pflanzen. XI. Zum Chlorophyllgehalt diploider und polyploider Pflanzen. **(Studies on polyploid plants. XI. Chlorophyll content of diploid and polyploid plants.)**
Züchter, 1951, **21**: 30-6, bibl. 22.

Leaf analyses of a large number of diploid and polyploid plants have shown that neither the quantity nor the composition of the leaf pigment is changed through polyploidy.—Baden branch of the Kaiser-Wilhelm-Inst. f. Züchtungsforschung, Erwin Baur Inst.

3163. Derx, H. G.
Diacetyl as a flower-scent with some remarks on chiropterophily.
Ann. bogor., 1950, **1**: 49-52, bibl. 4.

It is shown that diacetyl, the substance responsible for the characteristic smell of fresh butter and buttermilk, is produced in large quantities and in a practically pure state by the flowers of the tropical tree *Fagraea racemosa*. This substance was not detected in any of the bat-pollinated flowers tested, which have been described as having a " chiropterophilous " [=liked by bats] smell of sour milk.—Treub Lab., Bogor.

Physiology.

(*See also* 3228b, f, g, h, k, n, u, 3229g, k, 3251, 3259, 3347, 3348, 3356.)

3164. Ellengorn, Ja. E.
Cytophysiological analysis of the mutual reaction of the tissues of the rootstock and scion. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1951, No. 2, pp. 21-9, bibl. 10, illus.

To understand the biological processes involved in grafting, the cytological and physiological aspects of the graft union, as well as the morphological, should be studied. In this connexion the author describes his studies of the graft union between potato and tomato, with reference, chiefly, to the pH and the oxidation-reduction balance of the tissues.

3165. Franck, J.
A critical survey of the physical background of photosynthesis.
Annu. Rev. Plant Physiol., 1951, **2**: 53-86, bibl. 71.

Gaffron, H., and Fager, E. W.
The kinetics and chemistry of photosynthesis.
Annu. Rev. Plant Physiol., 1951, **2**: 87-114, bibl. 72.

The three workers at the Institute of Radiobiology and Biophysics (Fels Fund) of the University of Chicago survey the physical, kinetic and chemical bases of photosynthesis.

3166. Stutz, R. E., and Burris, R. H.
Photosynthesis and metabolism of organic acids in higher plants.
Plant Physiol., 1951, **26**: 226-43, bibl. 27, illus.

The results of earlier work with isotopic carbon [see *H.A.*, 20: 530] suggested the possible importance of malic acid as an early photosynthetic product. Consequently the distribution of C^{14} among several organic acids from leaves of plants supplied with $C^{14}O_2$ has been investigated. In leaves of bryophyllum, tomato, tobacco, barley, and rhubarb exposed to $C^{14}O_2$ in the light for 30 minutes, malic acid had the highest C^{14} specific activity and the highest total activity among the organic acids isolated. Malic acid appears to be a key compound in the organic acid metabolism of the plants examined. Plants allowed to fix $C^{14}O_2$ in the dark following a period of illumination assimilated particularly high concentrations and total amounts of C^{14} into malic acid. Fixation in the dark, following depletion of the plants in the dark, also yielded malic acid of high activity. Plants were exposed to $C^{14}O_2$ in the light for 15 minutes, part of the leaves were removed for analysis, and the rest of the plant was kept for four hours in the dark without $C^{14}O_2$. In the dark the specific activity of citric and oxalic acids increased in barley and the specific activity of the other organic acids decreased. During the dark period, the C^{14} specific activity of all organic acids in bryophyllum, and all but the isocitric acid fraction in tobacco, increased. Evidently a precursor of high specific activity was formed in the light by bryophyllum and tobacco and was converted to organic acids in the dark. Thus the organic acids isolated are not first products of photosynthesis but are formed from precursors synthesized in earlier steps of the photosynthetic process.—Univ. Wisconsin, Madison.

3167. Scarth, G. W., and Shaw, M.
Stomatal movement and photosynthesis in pelargonium. I. Effects of light and carbon dioxide.
Plant Physiol., 1951, **26**: 207-25, bibl. 18, illus., being *Contr. Fac. Agric., McGill Univ., Quebec, J. Ser.* **284.**

The way in which light induces stomatal opening was studied in pelargonium leaves by means of a new technique which allows the time courses of photosynthesis and stomatal movement to be followed more or less continuously in the same leaf. The results indicate that stomatal aperture at equilibrium is the same with different qualities of light when, at very different intensities, they produce a rate of photosynthesis that just balances respiration. The relationship of stomatal opening to photosynthesis rate, as compared with light intensity, and to the interaction of light intensity and the rate of supply of CO_2 to the leaf, is consistent with the view that the main action of light on stomata operates through photosynthetic reduction of CO_2 concentration within the leaf. The effect of CO_2-free air in largely but not entirely reducing the superiority of opening in green as compared with white parts of a variegated leaf seems to favour the same view. Though these findings tend to simplify the relation of stomatal movement to external factors, other phenomena, observed incidentally, point to a complex mechanism in the physiological response.

3168. Chouard, P.
Pourquoi fleurissent les plantes ? **(Why plants flower.)**
[*Publ.*] *Univ. Paris* (*Les Conférences du Palais de la Découverte*), 1950, pp. 62, bibl. 260.

Current theories on the causes and mechanism of flowering are critically reviewed.

3169. Chouard, P.
Expériences de longue durée sur le photopériodisme; leçons qui en découlent. **(Long-term experiments on photoperiodism; conclusions drawn.)**
Reprinted from *Mém. Soc. bot. Fr.*, 1949, **96**: 106-46, bibl. 31, as *Mém. Rech. Cons. nat. Arts Métiers*, 1950, pp. 41.

The photoperiodic behaviour of a very large number of plants was studied at the Conservatoire National des Arts et Métiers, Colombes (Seine) over a period of 5 years, 1944-49. This paper summarizes the results obtained with 148 species or varieties, mainly of wild French plants but also including ornamentals (chrysanthemum, *Dianthus* spp., primulas, Pernetiana rose, saxifrages, lilac, violets and others) and some vegetables (Jerusalem artichoke, pea, tomato, spinach) and fruits (strawberry, mulberry, red currant). On the basis of these results the common classification as "day-neutral", "long day", "short day" and "intermediate" plants is expanded into a more detailed grouping. The following problems are also discussed: (1) variation of photoperiodic response with age and physiological condition of the plant, (2) position of the flower bud, (3) stability or reversibility of flower induction, (4) growth phenomena accompanying photoperiodism and (5) photoperiodism and thermoperiodism in relation to ecology and phenology.

3170. Chouard, P.
Physiologie végétale. Induction réversible de morphoses foliaire opposées et de la mise à fleur chez deux scabieuses par le photopériodisme. **(Plant physiology. Reversible induction of opposed foliar morphoses and flowering in two species of *Scabiosa* by photoperiodism.)**
Reprinted from *C.R. Acad. Sci. Paris*, 1950, **230**: 119-21.

Under short day conditions *Scabiosa canescens* and *S. ukranica* remain indefinitely in the rosette stage of development. The rosette leaves of the former are entire while those of the latter are divided; both are glabrous and rather fleshy. Under long day conditions flower stems develop. The leaves arising from the stem of *S. canescens* are divided, thin and glabrous, while those of *S. ukranica* are entire, thin and hairy. The flower heads develop only after 2 or 3 months of long day treatment. If long day treatment is interrupted and short days are given, elongation ceases and the new leaves that develop have the short day characters typical of the species. Laciniation can therefore be induced by either long or short days depending on the species. Short internodes and a tendency to succulence, however, is typical of short day

conditions. The fact that the character of the leaf indicates a tendency to flowering before the flowers are actually formed makes it possible to reverse this tendency by controlling the photoperiod. It is concluded that these two species furnish excellent material for the study of factors affecting leaf morphology and reversal of flower induction.

3171. GALSTON, A. W., AND BAKER, R. S.
Studies on the physiology of light action. III. Light activation of a flavoprotein enzyme by reversal of a naturally occurring inhibition.
Amer. J. Bot., 1951, **38**: 190-5, bibl. 11.

The activity of crude preparations of the indoleacetic acid oxidase of etiolated peas is increased by light. The light receptor is believed to be a flavoprotein. The activity of the crude enzyme is also increased by dialysis or by repeated acetone washing, both of which procedures remove a naturally-occurring inhibitor of the enzyme. Such inhibitor-free enzyme preparations are not further activated by light, indicating that the light activation involved a reversal of the natural inhibition. The action of the inhibitor can be duplicated by 10^{-5}M Mn++, or by 10^{-3}M Cu++, Cu+, Co++, or Fe++. All these inhibitions are reversed by blue light. IAA oxidase has also been found in green tissues, the stems and leaves of green pea plants. A hypothesis is presented to explain these facts.—Calif. Inst. Technol., Pasadena.

3172. GALSTON, A. W., AND BAKER, R. S.
Studies on the physiology of light action. IV. Light enhancement of auxin-induced growth in green peas.
Plant Physiol., 1951, **26**: 311-17, bibl. 4, illus.

1. Excised stem sections of green pea plants will grow rapidly in fairly intense light if they are provided with 10-30 mg./l. of indoleacetic acid. Even at this optimal concentration of auxin, the sections grow poorly if kept in the dark. The light effect is probably due to photosynthesis, since illumination can be replaced by 4% sucrose. 2. The differences in behaviour between stem sections of etiolated and green peas may be summarized as follows: Light inhibits the growth of etiolated pea epicotyl sections by inactivating auxin, which limits the growth of this tissue; light stimulates the growth of green pea stem sections by causing a photosynthetic production of sugar, which limits growth in this tissue. Thus, these green tissues are apparently more limited by sugar than are the corresponding etiolated non-photosynthetic tissues. 3. The green pea section growth test is suggested as a convenient screening procedure for testing the growth-regulatory effects of various compounds. [Authors' summary.]—Calif. Inst. Technol., Pasadena.

3173. KLEŠNIN, A. F.
The effect of the different regions of the spectrum of physiological radiation on the size and development of plants. [Russian.]
Priroda, 1951, **40**: 3: 59-60, illus.

An account is given of experiments carried out at the Institute of Plant Physiology of the Timirjazev Academy of Science, where plants were grown in rooms specially illuminated with blue, green or red light, as required. The plants used included strawberry, cucumber, cabbage, soya bean and carrot. Blue or red light favoured growth, but not green, as this colour is only slightly absorbed by plants. In growing plants the increase in weight was greatest in orange-red light and least in green. In blue-violet light it was also good but the effect was less marked than in orange-red light. Under conditions of day-length favourable for flowering (whether for long-day or for short-day plants), this was attained earliest in orange-red, then in blue, and latest under green light. This was particularly marked in lettuce, which under red light did not form a rosette of leaves at all and flowered in 33 days; under blue it made a good rosette and flowered in 45 days, while under green it took 51 days to flower.

3174. FEDOROV, M. V., AND PODJAPOLJSKAJA, V. P.
The effect of environment in leguminous plants on the development of root nodules and yields. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **77**: 121-4, bibl. 9.

Experiments are described in which pea and runner bean plants were grown in pots in sand cultures and inoculated with the nodule bacterium, in order to study the effect of moisture and illumination. The best results were obtained under conditions of 60% to 80% soil moisture. With varied duration of illumination it was found that the best results on the whole were obtained with normal day light [length of day not stated]. The greatest development of nodules occurred with 8 hours daily illumination, but the plants did not flower.

3175. BOLLI, M.
Ricerche sulle vitamine. III. L'influenza dell'acido ascorbico sul quoziente respiratorio nei vegetali superiori. **(Research on vitamins. III. The effect of ascorbic acid on the respiratory quotient in the higher plants.)**
Ann. Fac. Agrar. Perugia, 1948, **5**: 51-69, bibl. 4 [received 1951].

Experiments with various organs of a number of plants (including immature olive fruits) show that treatment with vitamin C at 0·50‰ for 12 or 14 hours increases the respiratory quotient.

3176. ČAĬLAHJAN, M. H.
The effect of carotin on the growth and form of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **74**: 381-4, bibl. 10, illus.

An experiment was carried out with carotin applied in lanolin paste to the cut ends of petioles of *Chrysanthemum indicum*, *Perilla nankinensis* and *Rudbeckia bicolor*. Details are given of the reaction of the plants to the treatment. In general the effect was to arrest the growth of the terminal shoot and to stimulate the development of the side shoots. In chrysanthemums growth was checked and the leaves which developed were smaller from the bottom upwards, but they were dark green and thicker than normal. In another experiment chrysanthemums were treated with (1) carotin, (2) a dry powder prepared from saffron (*Crocus sativus*) stigmas, rich in carotinoids, (3)

crystallized chlorophyll, all in lanolin, applied to the cut surfaces on removing the apical portion of the stems. With (1) and (2) growth was arrested, but chlorophyll had no effect on growth.

3177. Smirnov, N. P.
Los ritmos de las plantas. **(The rhythm of plants.)**
Darwiniana, 1950, **9**: 306-12, illus.
The correlated interaction of certain biological processes in plants is discussed, many horticultural plants being used as examples. It is shown that the life of a plant consists of a combination of processes regularly repeated. Cell division occurs at regular time intervals, and new leaves appear at a rate which is specific for each species and which is correlated with the rhythm of cell division. The rates of flower and branch formation are in turn bound up with the rhythm of leaf formation. It is suggested that, since each species has its own growth rhythm, it should be possible to evolve a natural classification of plants, based on growth rhythm, which could be subject to strict mathematical interpretation.

3178. Bennet-Clark, T. A.
Water in the architecture of plants.
Endeavour, 1951, **10**: 151-4, bibl. 6.
" Water is of great importance as a structural material in plants. The maintenance by plants of an excess hydrostatic pressure—which keeps them rigid much as air keeps an inflated tyre rigid—poses an important question, for there must exist a mechanism by which flow of solute is maintained against the concentration gradient. In consequence energy is used up, and it must be concluded that plants work continuously merely to keep themselves erect." The author discusses possible theories with the aid of diagrams.

3179. Broyer, T. C.
Exudation studies on the water relations of plants.
Amer. J. Bot., 1951, **38**: 157-62, bibl. 20.
These studies [with barley and tomatoes] were concerned with rates of exudation and composition of these fluids relative to bathing media. They show that a number of factors are concerned in the movement of water into plant systems, in the absence of transpiration. Aeration, temperature, composition of the bathing medium, and internal influences determine the rates of solution flux. The inherent variability in process rates among otherwise similar plants, related to their individual genetic constitutional differences, should be recognized. The techniques here used do not afford evidence which would definitely support the thesis of the co-operation of a direct metabolic factor in exudation. They suggest, rather, that metabolic effects are primarily indirect, through influences on the solute relations of the system. Possible effects of zinc and auxin require further experiments for elucidation. [Author's summary.]—Univ. Calif.

3180. Army, T. J., and Kozlowski, T. T.
Availability of soil moisture for active absorption in drying soil.
Plant Physiol., 1951, **26**: 353-62, bibl. 26, being *Contr. Mass. agric. Exp. Stat.* **781.**
The relationship between exudation from detopped plants and soil moisture content was studied on New England soils of varying texture. Tomato, tobacco, maize and French bean were used as test plants.

Colchicine and polyploidy.

(*See also* 3162, 3195, 3834, 3916 l, n.)

3181. Lewis, D.
Production of polyploids by colchicine and X-rays.
Nature, 1951, **167**: 891-2, bibl. 6, illus.
In experiments with *Oenothera organensis* the use of X-rays increased the number of tetraploids in colchicine-treated plants, a dose of 1,000 r. being more effective than one of 500 r. The cut-back surfaces of tomato stems gave rise to a slightly higher proportion of tetraploid shoots than the controls if exposed to X-ray treatment (2,000 r.) 12-17 days after cutting back.—John Innes hort. Instn.

3182. Janaki Ammal, E. K.
Chromosomes and horticulture.
J. roy. hort. Soc., 1951, **76**: 236-9, illus.
The way in which the increase of chromosome number has been responsible for the majority of improved garden plants is discussed, with examples showing how the history of the strawberry, black mulberry and many other plants may be traced by a study of their chromosomes. As an example of how artificially-induced polyploidy is now being used in plant improvement, the author cites the case of the guava: a tetraploid with high vitamin C content has been produced which it is hoped may be crossed with a diploid to produce a seedless fruit.

3183. Wexelsen, H.
Polyploidiforedling. En oversikt. **(The production of polyploids. A review.)** [English summary 6 lines.]
Forskn. Landbruk., 1950, **1**: 287-310, bibl. pp. 2½.
Many of the subjects briefly discussed are of general horticultural interest, as for instance the effect of polyploidy on cold and drought resistance, on rate of development, fertility, etc. Apples, ornamentals and brassicas are among the crops to which special reference is made.

Growth substances.

(*See also* 3228j, x, z, 3278, 3291-3293, 3296-3298, 3317, 3340, 3341, 3371, 3500-3559u, 3655, 3656, 3833, 3842, 3897, 3972, 4110, 4111, 4122.)

3184. Hitchcock, A. E., and Zimmerman, P. W.
A quantitative method of measuring response of plants to growth regulators.
Contr. Boyce Thompson Inst., 1951, **16**: 225-48, bibl. 12, illus.
This paper describes an improved technique for treating intact tomato plants with 2,4-D and a rapid statistical procedure for evaluating the induced responses. On the basis of the minimum quantity of 2,4-D required to induce a given response, the efficiency of this method is about 3 times as great as the standard lanolin or spray solution methods, and about 20 times as great as the soil application method.

3185. VAN RAALTE, M. H.
Root formation by the petioles of *Ageratum houstonianum* Mill. as a test for auxin activity in tropical countries.
Ann. bogor., 1950, **1**: 13-26, bibl. 15.

In tropical countries plant material for the avena and pea tests for auxin activity has to be imported; the optimal temperature for the avena test, moreover, is lower than the mean temperature of many tropical laboratories. A new method of determining auxin activity has, therefore, been developed at the Treub Laboratory, Bogor, using the tropical plant *Ageratum houstonianum* as test material. In Bogor the plant may be obtained in large quantities throughout the year. Auxin activity is determined by the number of roots formed by the treated petioles. Large differences were observed between the reaction of adjacent petioles on the same plant, but the opposite petioles of a leaf pair showed relatively small differences in reaction. In comparing the activity of 2 solutions, 3 or 4 adjacent leaves from each plant are used for solution *a* and the opposite leaves for solution *b*, the total number of roots formed in each group are then compared. When more than 2 solutions are to be tested, the "symmetrical incomplete randomized block arrangement" devised by Yates can be used. The pH of the solution, between the limits of 4·5 and 7·0, had little effect on the number of roots formed. A linear relationship was found to exist between the logarithm of the number of roots formed and the logarithm of the concentration of growth substance used. As green tissue is used in the test, the effect of the auxin already in the plant must be separated from the effect of the applied auxin.

3186. LARSEN, P.
Formation, occurrence, and inactivation of growth substances.
Annu. Rev. Plant Physiol., 1951, **2**: 169-98, bibl. 190.

The author deals in turn with: forms of auxin and auxin-precursors and methods for their extraction and determination; the chemical identity of naturally occurring growth substances; the formation of growth substances; their production and occurrence during certain phases of development; and inactivation of growth substances.

3187. HEY, G. L., AND HOPF, P. P.
A new theory of the action of plant hormones.
Reprint from *Grower*, 1951, Vol. **35**, Nos. 2, 3 and 4, pp. 12.

Results of numerous experiments [only the results of which are given] indicate that certain plant hormones used in conjunction with a suitable co-reacting vitamin can induce definite responses in certain plants. Plants used in these trials were apples, potatoes, peas, lettuce, mushrooms, tomatoes, cereals and sugar beet, and the responses took the form of increased or earlier cropping, resistance to frost, increased sugar content and possible increased resistance to fungus disease.—Murphy Chem. Co., Wheathampstead, Herts.

3188. HEY, G. L.
Practical ideas for hormone plus vitamin spraying.
Grower, 1951, **35**: 507, 509.

Three types of hormone vitamin combinations were used in trials [see abstract above], of which group C (hormone+vitamin K) showed promise in making fruit trees, particularly apples, frost resistant and may possibly induce fruit setting, coloration and rooting. Group B (hormone+vitamin H) gave improved yields of apples, potatoes and peas, and is suggested may bring a solution of the biennial bearing problem near. Group A (hormone+vitamin B pp) increased the sugar content of sugar beet.

3189. ZIMMERMAN, P. W., AND HITCHCOCK, A. E.
Growth-regulating effects of chlorosubstituted derivatives of benzoic acid.
Contr. Boyce Thompson Inst., 1951, **16**: 209-13, bibl. 10, illus.

2,3,6-trichlorobenzoic acid and its aldehyde derivative do not fulfil the structural requirements for physiological activity specified by previous workers. In laboratory experiments, however, using tomato, Turkish tobacco and stevia (*Piqueria trinervia*) as test plants, these chemicals were found to cause cell elongation and proliferation of tissue, to induce adventitious roots, to modify the pattern of leaves and other organs, and to cause parthenocarpic development of fruit. It is concluded, therefore, that they should be added to the list of hormone-like substances.

3190. LINK, G. K. K., AND KLEIN, R. M.
Inhibitory and stimulatory effects of indoleacetic acid on development of the bean hypocotyl.
Bot. Gaz., 1951, **112**: 400-17, bibl. 12, illus.

An experiment was carried out to determine the effect of 3% indoleacetic acid-lanoline paste when applied to the hypocotyl of kidney bean (*Phaseolus vulgaris*) seedlings. These applications caused discoloration, temporary inhibition of the straightening of the hypocotyl arch and increase in its diameter. When the seedlings eventually straightened they remained short, and the leaves were smaller than those of untreated seedlings. All changes in the breadth and length of the hypocotyl, and its straightening, are due to cell elongation or to increases in cell volume and intercellular spaces, and not to differences in the number of cell divisions. Applications made 24-48 hours after the arch stage produced bending, but applications after 72 hours only produced local tumours. Tissue above the applications may also be affected. C.W.S.H.

3191. MICHEL, B. E.
Effects of indoleacetic acid upon growth and respiration of the kidney bean.
Bot. Gaz., 1951, **112**: 418-36, bibl. 22.

Applications of 3% indoleacetic acid-lanoline paste to the arch of *Phaseolus vulgaris* seedlings prolonged the initial rate of respiration of the hypocotyls. In untreated seedlings respiration rate falls rapidly with time. Respiration and growth of the epicotyl and upper hypocotyl were inhibited. In the lower hypocotyl the rate of fall of respiration was reduced. The respiration of the plant as a whole was not, however, affected by the applications. Anaerobic respiration of the hypocotyl was increased by indoleacetic acid. The elongation of the lower hypocotyl was inhibited, but the rates of increase of the diameter, volume and weight were hastened. C.W.S.H.

3192. Redemann, C. T., Wittwer, S. H., and Sell, H. M.
The fruit-setting factor from the ethanol extracts of immature corn kernels.
Arch. Biochem., 1951, **22**: 80-4, bibl. 9, being *J. Art. Mich. agric. Exp. Stat.* **1207.**

The fruit-setting factor of the ethanol extract of immature kernels of sweet corn (*Zea mays rugosa*, var. *Golden Cross*) has been identified as the ethyl ester of 3-indoleacetic acid. This ester is approximately 100 times more effective than is 3-indoleacetic acid in inducing parthenocarpy in the tomato. [Authors' summary.]

3193. Sívori, E. M., and Claver, F. K.
Influencia del 2,4-D sobre las enzimas de oxidación y reducción. (**The effect of 2,4-D on oxidation and reduction enzymes.**) [English summary ½ p.]
Rev. argent. Agron. B. Aires, 1950, **17**: 1-10, bibl. 9.

Tubers of the potato variety Katahdin were soaked in 0·75, 1·5 or 3·0% solutions of the sodium salt of 2,4-D for 24 hours, washed and stored for several days. The effect of the treatment on the enzyme activity and reducing power of the tubers was then determined. Catalase activity was increased by all treatments, the maximum increase being 15·8% with the 1·5% solution. Reducing power was increased from 10% to more than 50%, depending on the concentration of 2,4-D and on the time elapsing between treatment and determination; 15 days after treatment the effect of 2,4-D was negligible. Peroxidase activity was increased 8-15%, depending on the concentration used. Polyphenolase activity was disturbed by treatment, but the results were too inconsistent to allow any conclusion to be drawn.—Nat. Univ. La Plata, Argentina.

3194. Alamercery, J., Hamner, C. L., and Latus, M.
Chlorophyll inhibition and growth regulation by several tetronic acid derivatives.
Nature, 1951, **168**: 85, bibl. 8.

When cucumber seeds were germinated in 100 p.p.m. 3-(α-imino ethyl)-5-methyl-tetronic acid, the most interesting of the compounds tested, they produced large yellow cotyledons and etiolated hypocotyls. On transplanting into soil the seedlings became white and died after 5-6 days. At higher concentrations the seedlings were chlorotic and the hypocotyls were markedly inhibited in their development. The action of certain other tetronic acids is also described.—Michigan State College.

Radioactive materials.

(*See also* 3166, 3771, 3822.)

3195. Dimond, A. E.
Agricultural research in the atomic age.
Agric. Chemls, 1951, **6**: 7: 35-8, 111-13, illus.

The author, of the Connecticut Experiment Station, New Haven, discusses the use of isotopes for the production of mutants, in nutritional research and in the study of insecticides and herbicides.

3196. Klečkovskiĭ, V. M., Celiščev, S. P., and Evdokimova, T. P.
Determining the indicator phosphorus content in leaves of living plants. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1951, No. 3, pp. 86-90, bibl. 5, illus.

An apparatus is described for the determination of radioactive phosphorus (P^{32}). It is supported on a stand and clamped to the living leaf on the plant. Data are given for soya bean leaves.

3197. Klečkovskiĭ, V. M., Stoletov, V. N., and Evdokimova, T. P.
The exchange of indicator phosphorus in grafted plants. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1951, No. 3, pp. 73-85, bibl. 7.

This is a study of the movement of an indicator radioactive isotope of phosphorus (P^{32}) when added to nutrient media used for growing grafted plants (various varieties of tomato on black nightshade and *vice versa*). The progress of the P^{32} through the root system and stem of the rootstock to the scion depends on the tomato variety used and its condition. In these experiments the greatest accumulation of the indicator occurred in the above ground organs of nightshade.

3198. Chen, S. L.
Simultaneous movement of P^{32} and C^{14} in opposite directions in phloem tissue.
Amer. J. Bot., 1951, **38**: 203-11, bibl. 33, illus.

The results of stripping, ringing and oxygen curtailment experiments with willow cuttings indicated that P^{32} when supplied to the leaves moved chiefly through the phloem. By supplying $C^{14}O_2$ to the leaves of stripped geranium plants it was found that carbohydrates also moved mainly in the phloem tissue. When P^{32} and C^{14} were supplied separately to leaves at different ends of a stripped area on a geranium stem, considerable quantities of both P^{32} and C^{14} were found in the phloem tissue, both in stripped and unstripped sections. These results are considered to provide conclusive evidence for the simultaneous movement of the tracers in opposite directions in the phloem tissue.—Carnegie Inst. Wash., Stanford, Calif.

Nutrition.

(*See also* 3228a, d, e, m, 4096.)

3199. van Vuren, J. P. J.
Compost.
Bull. Dep. Agric. S. Afr. **310** (*Bull. Soil Conserv. Ext. Serv.* **9**), 1950, pp. 39, bibl. 26, illus., 6d.

As regards preparation, notes are given on the following methods: kraal, heap and trench, Bangalore farm-composting, soaking-pit, ADCO, New Zealand compost-box, municipal compost method. In addition fly control precautions are detailed.

3200. Robertson, R. N.
Mechanism of absorption and transport of inorganic nutrients in plants.
Annu. Rev. Plant Physiol., 1951, **2**: 1-24, bibl. 145.

The author, after discussing difficulties of terminology,

deals with his subject under the headings of diffusion, ion exchange and Donnan effects, combination, accumulation and transport within the plant. Among outstanding problems still needing solutions he cites: the nature and concentrations of the substances on which ion exchange occurs; the affinities of cell substances for different inorganic ions; the combination of K with some cellular substance which apparently does not combine with sodium; the sub-microscopic morphology of the cytoplasm; and the mechanism of the movement of ions in the phloem.

3201. Breazeale, E. L., McGeorge, W. T., and Breazeale, J. F.
Nutrition of plants considered as an electrical phenomenon—a new approach.
Soil Sci., 1951, **71**: 371-5, bibl. 4, illus.

Experiments support the theory that ion absorption by plants is an electrical phenomenon. Cation uptake is shown to be a function of the electrical potential of the specific ion. Ions are mobile and are probably absorbed and transported in response to an electrical impulse by a vital impulse within the plant. An experimental technique is presented to show how the Fisher electropode can be used in a study of ion absorption by plants. An illustration shows the technique applied to eucalyptus plants, one electrode being attached to the aerial part of the plant, and the other to the nutrient solution.—Ariz. agric. Exp. Stat.

3202. White, P. R.
Nutritional requirements of isolated plant tissues and organs.
Annu. Rev. Plant Physiol., 1951, **2**: 231-44, bibl. 223.

The period covered is from 1939 to 1950. An examination of the literature shows that despite the greatly increased interest in the culture of plant tissues there is still a dearth of data on the functions of the various substances studied. A detailed analysis of nutritional problems is possible but still remains to be made.

3203. Hewitt, E. J.
The role of the mineral elements in plant nutrition.
Annu. Rev. Plant Physiol., 1951, **2**: 25-52, bibl. 225.

The author, basing his remarks on an intensive study of the literature and on his own work at Long Ashton in England, devotes attention here to the relation of mineral nutrients to enzyme systems and to a general discussion of some less familiar aspects of nutrient interrelationships. The nutrients concerned are potassium, ammonium, calcium, chlorine, magnesium, phosphorus, manganese, iron, boron, zinc, copper, cobalt, molybdenum and sulphur.

3204. Brandt, C. S., and Beeson, K. C.
Influence of organic fertilization on certain nutritive constituents of crops.
Soil Sci., 1951, **71**: 449-53, bibl. 10.

The problems incident to evaluation of the variations in over-all nutritional quality of a crop as influenced by some environmental factor such as fertilization are discussed. Limited data on the ascorbic acid, carotene, iron, and copper content of certain crops in relation to organic *vs.* mineral fertilization are presented. No significant differences attributable to the source of plant nutrients were found. Data are tabulated for carrots, green snap beans, seedling rye, and potato tubers.

3205. Wallace, T.
Diagnosis of soil fertility by visual symptoms of crops.
Reprinted from *Trans. int. Congr. Soil Sci.*, Amsterdam, 1950, Vol. I, pp. 8, bibl. 5.

A review on the value and limitations of the visual method of diagnosis of nutritional disorders, with a note on the use of indicator plants and indicator plots.

3206. Mazaeva, M. M.
Susceptibility to magnesium deficiency and the photoperiodic reaction of plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 191-4, bibl. 11, illus.

The reactions of plants to magnesium deficiency are discussed, and the yields of short-day and long-day plants (including a number of vegetable and ornamental plants), grown in pots, resulting from applications of NPK+$MgSO_4$ and of NPK only, are tabulated. It is shown that the short-day plants are generally more sensitive to magnesium deficiency than long-day plants.

3207. Löhnis, M. P.
Verschijnselen van mangaanvergiftiging bij cultuurgewassen. **(Symptoms of manganese toxicity in crop plants.)**
Reprinted from *T.N.O.-nieuws*, 1950, Vol. **5**, No. 49, pp. 6, bibl. 3, illus.

Plants of brown bean (*Phaseolus*), grown at the Microbiological Laboratory, Wageningen, on unlimed plots and plots manured with sulphate of ammonia, made poor growth and the young leaves showed marked interveinal and marginal yellowing; the older leaves were crinkled and developed yellow or white patches with necrotic spots. On severely affected plants, well-defined purplish-brown spots appeared on the petioles of the youngest leaves. Nutrient solution experiments proved these symptoms to be due to Mn toxicity. Affected leaves had a Mn content of 1,000-3,000 p.p.m. of the dried material, compared with 100-500 p.p.m. in healthy leaves. The Princess bean was found to be even more susceptible to Mn toxicity than the brown bean, and the level at which symptoms appeared on young plants was very constant (1,104-1,211 p.p.m.). Temperature, however, had a marked effect on the appearance of symptoms. Pot experiments showed that uptake of Mn was greater in unlimed than limed soil. A wide range of susceptibility to Mn toxicity was shown by various agricultural crops, strawberries and tobacco. Soil analysis was not found to be a reliable method of determining the availability of Mn in the soil, and the use of the Princess bean as an indicator plant is recommended.

3208. Quinlan-Watson, T. A. F.
Aldolase activity in zinc-deficient plants.
Nature, 1951, **167**: 1033-4, bibl. 3.

From experiments with oat and subterranean clover plants it is concluded that " one of the reasons for failure of plants grown in zinc-deficient media is the breakdown of normal carbohydrate metabolism due to

decreased activity of the enzyme, aldolase, which catalyses the reversible reaction between hexose diphosphate and triose phosphate ".—Commonwealth Scientific and Industrial Research Organization, Adelaide.

Culture media and solutions.

(*See also* 3228q, 3248, 3249.)

3209. DE CAPITE, L.
Il pH delle soluzioni nutritive e la sua influenza sullo sviluppo dei vegetali. (The pH of nutrient solutions and its effect on plant development.)
Ann. Fac. Agrar. Perugia, 1948, **5**: 135-45, bibl. 14, illus. [received 1951].
Plants growing in media of optimum pH show (*a*) increase in height, (*b*) vigorous development of the aerial parts, (*c*) marked increase in the root system, (*d*) regular development of secondary roots, (*e*) absence of injury to the leaf tips. Mention is made of plants which prefer an acid, an alkaline or a neutral culture medium.

3210. JACOBSON, L.
Maintenance of iron supply in nutrient solutions by a single addition of ferric potassium ethylenediamine tetra-acetate.
Plant Physiol., 1951, **26**: 411-13, bibl. 3.
In tests with tomato, sunflower, maize and barley grown in Hoagland's nutrient solution it was found that 5 or 10 p.p.m. iron supplied as the ethylenediamine tetra-acetate complex provides adequate iron to the plant, is non-toxic and need be added only once.—Univ. Calif., Berkeley.

3211. FRANK, E. M., RIKER, A. J., AND DYE, S. L.
Comparisons of growth by tobacco and sunflower tissue on synthetic media containing various sources of organic nitrogen.
Plant Physiol., 1951, **26**: 258-67, bibl. 16.
The growth of tobacco callus tissue on synthetic media containing one or more of six nitrogen compounds was compared with that of sunflower tissue on the same media. The nitrogen compounds investigated were sodium nitrate, ammonium succinate, urea, alanine, glutamic acid and leucine. The growth of tobacco tissue was less than that of sunflower in every case, and the optimum concentration for each substance was lower for the tobacco tissue. The variation of the different tissues may be associated with variations in their critical amino-acid balances.—Univ. Wisconsin, Madison.

3212. NORTHCRAFT, R. D.
The use of oxalate to produce free-living cells from carrot tissue cultures.
Science, 1951, **113**: 407-8, bibl. 11.
A chemical method is described whereby single, viable, bacteria-free cells of varying age and size may readily be obtained from plant tissue cultures.

3213. KANDLER, O.
Versuche zur Kultur isolierten Pflanzengewebes *in vitro*. **(Experiments on the cultivation of plant tissues *in vitro*.)**
Planta, 1950, **38**: 564-85, bibl. 34.
Successful tissue cultures of *Helianthus annuus*, *Impatiens sultani*, *Daucus carota*, *Nicotiana tabacum*, *Solanum lycopersicum*, *Datura chlorantha* and *Althaea rosea* are described, while all attempts at culturing tissues of monocotyledons failed.—Munich Univ.

Practical devices.

(*See also* 3228s, 3229b, 3263, 3318, 3323, 3463, 3489-3491, 3734, 3788.)

3214. RICHARDSON, D. A.
Quonset-type glasshouse.
N.Z. J. Agric., 1951, **82**: 219-21, illus.
A greenhouse, erected recently at Invercargill on an adapted Nissen (or Quonset) hut design, has proved successful. The constructional work is entirely in reinforced concrete, and details of the first of these buildings with method of construction are given. The shape of the roof gives protection against hail and the maintenance costs are very low, as only the putty needs painting.

3215. K., G.
Le chauffage électrique des serres et des couches par les tuyaux " Protolit ". **(Electric heating of greenhouses and frames by " Protolit " tubes.)**
Rev. hort. suisse, 1951, **24**: 186-8, illus.
The method described is recommended for heating the air in greenhouses. The tubes containing the heating cable can be coiled to form radiators or they can be suspended in the air. They can also be used to warm water tanks.

3216. SIRONVAL, C.
Le phytotron de l'Institut Botanique de l'Université de Liège et ses possibilités. **(The phytotron of the Botanical Institute of Liège University and its potential uses.)**
Bull. hort. Liège, 1950, **5** n.s.: 348-51, from abstr. in *Ann. Gembl.*, 1951, **57**: 109.
A phytotron, the first in Europe, has been installed at the Botanical Institute, Liège. It gives complete control of temperature, humidity and day length.

3217. JACKS, H., AND HUNTER, J. A.
Apparatus for low-pressure steaming of nursery soil.
N.Z. J. Agric., 1951, **82**: 215-16, illus.
A low-pressure steaming apparatus capable of disinfecting sufficient nursery soil for the requirements of commercial growers is described. It is safe to use and requires little attention during operation. The components are a boiler, a fuel-supply system, and a soil box assembly; these are described. Tomato, lettuce, and cauliflower seeds were sown in soil treated by the method 24 hours previously. Emergence and growth of seedlings proved satisfactory and the treatment also gave good control of damping-off and weeds.

3218. FREW, S.
Oscillating cultivator.
N.Z. J. Agric., 1951, **82**: 27-9, illus.
A new type of cultivator, invented and developed in Blenheim (New Zealand), is described. Its feature is the application of the principle of oscillation to a cultivating implement which should be especially useful

to growers of market garden crops, tobacco, small fruits, and other row crops. The oscillating principle has been developed to the extent of providing a 45-degree movement from central pivots to two blades each 12 in. long and 5 in. wide at their widest point. The blades are attached to the chassis by vertical driving shafts and are set horizontally at any required depth. Moving at high speed, they thoroughly pulverize the ground and destroy any weed growth with ease.

3219. Delperée, R.
Les tuyaux en polythène au service de l'agriculture, de l'industrie et de la construction. **(Polythene pipes in the service of agriculture, industry and building.)**
Ann. Gembl., 1951, **57**: 94-8.
Owing to their resistance to frost, corrosion and pressure, polythene pipes are of great value as irrigation and spray lines.

3220. Darlot, A.
Utilisation de siphons pour la distribution de l'eau d'irrigation. **(Using siphons for the distribution of irrigation water.)**
Terre maroc., 1951, **25**: 122-6, illus.
A method is described, with the aid of diagrams and photographs, by which water is distributed by means of siphons from the irrigation channels to the cultivated plots. The siphons are not easily broken and can readily be moved from place to place as required.

3221. Mazzarella, P.
L'irrigazione a pioggia. **(Spray irrigation.)**
Humus, 1951, **7**: **6**: 11-14, illus.
Well illustrated general notes on the practice and its probable value in particular regions of northern Italy.

3222. Analytical Measurements, Inc.
Portable pH meter.
Rev. sci. Instrum., 1951, **22**: 348, illus.
Completely self-contained for use in the field, this instrument, which weighs 3 lb., is carried in a camera-type case. An accuracy of 0·1 pH is obtainable.

3223. Maramorosch, K.
A simple needle for micro-injections.
Nature, 1951, **167**: 734.
A micropipette is described which makes it possible to measure accurately small amounts of a virus inoculum introduced into insect vectors. The same simple device may also prove useful for introducing small amounts of fluids into cells.—Rockefeller Inst. for Medical Res., N.Y.

3224. Frei, E. H., and Hirshfeld, F. L.
An exposure meter for the electron microscope.
Rev. sci. Instrum., 1951, **22**: 231-2, bibl. 1, illus.
A simple exposure meter has been developed which measures directly the beam current reaching the fluorescent viewing screen of the electron microscope. By its use, the characteristic curve of a Kodak lantern slide plate has been plotted at constant intensity of electron beam. The value of beam intensity given by the exposure meter is confirmed by direct counts of electron tracks in the developed emulsion. [Authors' synopsis.]

3225. Kopac, M. J.
An improved micromanipulator for cellular micrurgy.
Science, 1951, **113**: 232-4, bibl. 6, illus.
The modifications described in this paper were designed to correct the faulty vertical controls in the standard Chambers' micromanipulator.

3226. L'Office Belge du Commerce Extérieur.
Belgian Agricultural Machinery, 1951, 11 × 8½ in., pp. 50, mainly illustrations.
An artistic portrayal of what Belgium can and does produce. Those interested should apply to the Office Belge du Commerce Extérieur, 15 rue des Augustins, Brussels.

3227. Davies, D. A.
Artificial stimulation of rain at Kongwa.
Nature, 1951, **167**: 614, bibl. 3.
The Overseas Food Corporation, in collaboration with the East African Meteorological Department, is conducting a series of experiments at Kongwa, Tanganyika, on the artificial stimulation of rainfall. The trials involve the development of a new method for the production of silver iodide particles which act as sublimation nuclei in supercooled clouds. The silver iodide particles are produced by the explosion of small charges of gunpowder which have been impregnated with silver iodide. Each charge normally consists of 15 g. of gunpowder. These charges are carried into suitable clouds by hydrogen-filled balloons, the explosion being effected by a time-fuse which is set to explode at approximately the freezing-level of 15,000 ft. For several reasons, which are given, the new method is believed to be much more effective than the production of silver iodide particles by ground generators.

Noted.

3228.

a Borbolla y Alcalá, J. M. R. de la, and Borbolla, M. de los A. C. de R. de la.
La preparación de soluciones nutritivas para investigaciones de nutrición vegetal. **(The preparation of nutritive solutions for investigating plant nutrition.)**
Bol. Inst. Invest. agron. Madrid, 1950, **10**: 525-59, bibl. 44.

b Bünning, E.
Über die photophile und skotophile Phase der endogenen Tagesrhythmik. **(The light- and dark-loving phases of endogenous day rhythm in plants.)**
Planta, 1950, **38**: 521-40, bibl. 21.

c Burgos, J. J.
El evapotranspirómetro de Thornthwaite. **(The Thornthwaite evapotranspirometer.)** [English summary ⅓ p.]
Rev. Fac. Agron. La Plata, 1950, **27**: 221-31, bibl. 10, illus., reprinted as *Publ. Ser. agromet. Dir. gen. Serv. met. nac.* **2.**

d CHAO, T. T.
Soil magnesium and its relationship to plant growth. [Chinese with English summary ½ p.]
Taiwan Sugar J. Quart., 1950, **3**: 1: 157-75, bibl. 121.
A review of the literature.

e CHESTERS, C. G. C., AND ROLINSON, G. N.
The role of zinc in plant metabolism.
Biol. Rev., 1951, **26**: 239-52, bibl. 81.
A review of the literature.

f CHOUARD, P.
Coup d'oeil sur les mécanismes régulateurs du développement: 1. chez les plantes annuelles et bisannuelles; 2. chez les plantes vivaces. **(A brief review of some factors affecting growth habit and flowering: (1) in annuals and biennials; (2) in perennials.)**
Reprinted from *Bull. Soc. bot. Fr.*, 1949, **96**: 218-20, 235-8 [received 1951].

g CHOUARD, P.
Physique végétale. Sur les réactions de croissance au photopériodisme. **(Plant physics. Growth reactions to photoperiodism.)**
Reprinted from *C.R. Acad. Sci. Paris*, 1946, **223**: 1174-6 [received 1951].

h CHOUARD, P.
Sur le photopériodisme chez les plantes vivaces. **(The photoperiodism of perennial plants.)**
Reprinted from *Bull. Soc. bot. Fr.*, 1946, **93**: 373-7, and 1947, **94**: 399-409 [received 1951].

i CLOTHIER, G. E.
Sunshine at Long Ashton, 1921-1950.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 208-15.

j CRAFTS, A. S.
Movement of assimilates, viruses, growth regulators, and chemical indicators in plants.
Bot. Rev., 1951, **17**: 203-84, bibl. 163, illus.
A critical review of the literature.

k DOROUGH, G. D., AND CALVIN, M.
The path of oxygen in photosynthesis.
J. Amer. chem. Soc., 1951, **73**: 2362-5, bibl. 3.

l GARCÉS O., C.
Naturaleza de la resistencia a la enfermedád, en las plantas. **(The nature of disease resistance in plants.)**
Rev. Fac. nac. Agroń. Colombia, 1949, **10**: 334-58, bibl. 52 [received 1951].

m GEORLETTE, R.
L'ammoniaque, engrais azoté de l'avenir ? **(Ammonia, the nitrogen fertilizer of the future.)**
Ann. Gembl., 1951, **57**: 99-100, bibl. 12.
The use of gaseous and anhydrous ammonia.

n GRANICK, S.
Biosynthesis of chlorophyll and related [tetrapyrrolic] pigments.
Annu. Rev. Plant Physiol., 1951, **2**: 115-44, bibl. 111.

o HÄNNINEN, P.
Koeympyröiden käytöstä kenttäkokeissa. **(Using round plots for field experiments.)** [English summary ¼ p.]
Valt. Maatalousk. Tied. **223**, 1951, pp. 6, bibl. 2, illus.

p HAUSZER, K.
Die wirtschaftliche Bedeutung des österreichischen Gartenbaues. **(The economic importance of horticulture in Austria.)** [English summary ¾ p.]
Mitt. Klosterneuburg, 1951, **1**: 6-14.

q HOMES, M. V., AND ANSIAUX, J. R.
L'aquiculture, technique de production commerciale. **(Waterculture, commercial technique.)**
I.R.S.I.A. C.R. Rech. Travaux Cent. Ét. Rech. Aquicult. **3**, 1950, pp. 7-60, illus., from abstr. in *Ann. Gembl.*, 1950, **56**: 227.
Successful experiments with tomatoes and arum lilies.

r HUMMEL, F. C.
Instruments for the measurement of height, diameter and taper on standing trees.
For. Abstr., 1951, **12**: 261-9, bibl. 74, illus.

s KALBFLEISCH, W.
Mower repairs and adjustments.
Publ. Canada Dep. Agric. **746**, 1951 Reprint, pp. 15, illus.

t KULIEV, A. M.
A capillary method of determining the honey production of plants. [Russian.]
Bot. Žurnal, 1951, **36**: 175-82, bibl. 10.

u LEVITT, J.
Toward a clearer concept of osmotic quantities in plant cells.
Science, 1951, **113**: 228-31, bibl. 18.

v LINSKENS, H. F.
Quantitative Bestimmung der Benetzbarkeit von Blattoberflächen. **(The quantitative determination of the wettability of leaf surfaces.)**
Planta, 1950, **38**: 591-600, bibl. 33.

w MACFARLANE, E. W. E., MESSING, A. M., AND RYAN, M. H.
Effects of water source on toxicity of mercurial poisons. I. Standardization of procedure in tests using *Allium* roots.
J. Hered., 1951, **42**: 95-9, bibl. 15, illus.

x MILLS, K. S., AND SCHRANK, A. R.
Some effects of decapitation on electrical and elongation phenomena in the *Avena coleoptile*.
Plant Physiol., 1951, **26**: 343-52, bibl. 14, illus.

y MINISTRY OF AGRICULTURE, LONDON.
Cloche cultivation.
Adv. Leafl. Minist. Agric. Lond. **375**, 1950, pp. 8.

z MUIR, R. M., AND HANSCH, C.
The relationship of structure and plant-growth activity of substituted benzoic and phenoxyacetic acids.
Plant Physiol., 1951, **26**: 369-74, bibl. 11.

3229.

a NELSON, G. H., TALLEY, L. E., AND ARONOVSKY, S. I.
Chemical composition of grain and seed hulls, nut shells, and fruit pits.
Trans. Amer. Ass. Cereal Chemists, 1950, **8**: 1: 58-68, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **A.I.C.-187,** Suppl. 5, p. 1.
To determine their suitability for agricultural purposes.

b PALLERONI, N. J.
Utilización de cámaras de negativo pequeño para la obtención de fotografías de objetos cercanos y fotomicrografías. **(A method of using a miniature camera to take photographs at close range and microphotographs.)** [English summary ¼ p.]
Rev. Fac. Cien. agrar., 1949, **1**: 51-60, illus. [received Dec. 1950].

c PAMMER, F.
Die staatliche Gesetzgebung zum Schutze der österreichischen Pflanzenzüchtung. **(Legislation for the protection of plant breeding in Austria.)**
Bodenkultur, 1950, **4**: 405-14.

d PEARSON, C. E.
The development of modern horticulture [in England].
Agriculture, Lond., 1951, **57**: 573-8, illus.

e SESHADRI, T. R.
Biochemistry of natural pigments (exclusive of haeme pigments and carotenoids).
Annu. Rev. Biochem., 1951, **20**: 487-512, bibl. 122.

f SOMERS, G. F., AND HAMNER, K. C.
Phototube-type integrating light recorders: A summary of performance over a five-year period.
Plant Physiol., 1951, **26**: 318-30, bibl. 7, illus.
For measuring sunlight under field conditions.

g STEINBACH, H. B.
Permeability.
Annu. Rev. Plant Physiol., 1951, **2**: 323-42, bibl. 164.

h THOMAS, J. B.
A method for the quantitative determination of the amount of fibrous roots in a root system.
Ann. bot. Gdns, Buitenzorg, 1941, **5**: 115-23, bibl. 3 [received 1950].

i THOMAS, M.
Vegetable acids in higher plants.
Endeavour, 1951, **10**: 160-5, bibl. 18.

j THOMPSON, J. F., ZACHARIUS, R. M., AND STEWARD, F. C.
Investigations on nitrogen compounds and nitrogen metabolism in plants. I. The reaction of nitrogen compounds with ninhydrin on paper: A quantitative procedure.
Plant Physiol., 1951, **26**: 375-97, bibl. 30, illus.

k TURNER, J. S.
Respiration. The Pasteur effect in plants.
Annu. Rev. Plant Physiol., 1951, **2**: 145-68, bibl. 72.

l WAYGOOD, E. R., AND CLENDENNING, K. A.
Intracellular localization and distribution of carbonic anhydrase in plants.
Science, 1951, **113**: 177-9, bibl. 10.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 3149, 3161, 3187, 3188, 3312a, d, m, p, r, u, 4084, 4086, 4090, 4093, 4152 and annual report section.)

3230. SCHMID, G.
Die Umstellung der schweizerischen Obstbaues auf weite Sicht gesehen. **(The transformation of fruit growing in Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 291-6, illus.
Changing market conditions necessitate changes in fruit production, of which the removal and replacement of perry pears is the most important.

3231. BÄGGLI, W.
Zweck, Ziel und Methode der eidgenössischen Obstbaumzählung. **(The purpose, object and method of the co-operative fruit tree census.)**
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 275-80.
A knowledge of prevailing market conditions and available supplies is all important for economic fruit production. A determination of what fruit is available is possible only when statistical figures show not only the quantity but also the type, age, vigour and other important factors relating to individual fruit species. The method used to obtain this detailed information in the fruit tree census now in progress in Switzerland is discussed.

3232. KLANG, C. A.
Frukthäcksodling enligt metod Lepage. **(Lepage's method of training fruit trees as hedges.)**
Fruktodlaren, 1950, No. 6, pp. 213-16, and 1951, No. 1, pp. 10-12, illus.
Lepage's method of training fruit trees as hedges composed of closely planted trees with arched branches is described and illustrated by diagrams and photographs. The method, similar to that used in training spindle bushes, aims at early bearing and heavy cropping as the result of tying the branches down. The author suggests that it be tried in Sweden where it would facilitate covering as a method of frost protection.

3233. Blair, D. S., and Davis, M. B.
Apple growing in eastern Canada.
Publ. Canada Dep. Agric. **847**, 1950, pp. 52, bibl. 4, illus.
Notes are included on location, climatic conditions, site, preparation of the land, propagation, planting, windbreaks, pollination, pruning, thinning, harvest sprays, treatment of frost injured trees, mouse and rabbit control. Thirty-seven varieties are described.

3234. Hoffman, M. B., and Boynton, D.
Cultural practices in the bearing apple orchard.
Ext. Bull. Cornell Agric. Exp. Stat. **789**, 1950, pp. 46, illus.
These recommendations to New York apple growers include, among other subjects, information on hand pollination, spraying to control pre-harvest drop, and mouse control.

3235. Crossa-Raynaud, P.
L'expérimentation fruitière au cours de la campagne 1950. De quelques résultats concernant la culture de l'abricotier en Tunisie. **(Experiments in 1950. Some results concerning apricot growing in Tunisia.)**
Tunis. agric., 1951, **52**: 1: 5-20, bibl. 5, illus.
This is an account of (1) The history of the apricot in Tunisia. (2) Drying (methods, sulphuring, costs, returns). (3) Fresh apricots (marketing, handling, varieties). (4) Other products (dried slices). Plans are provided of a sulphuring chamber and of a typical dehydrator.

3236. Edgerton, L. J.
Cherry growing in New York.
Ext. Bull. Cornell Agric. Exp. Stat. **787**, 1950, pp. 24, bibl. 4, illus.
Commercial cherry production in New York is concentrated in a few favourable areas. In 1948, 20,500 tons of sour cherries and 3,000 tons of sweet cherries were produced in the state, and it is considered likely that in the near future production will remain at about the present level. In this bulletin climatic and soil requirements, stocks, planting, cultural practices, harvesting and varieties are dealt with. For information on pest and disease control the reader is referred to *Ext. Bull.* 711.

3237. Castro Rego, Z. P.
A zona produtora da cereja de Alenquer. **(The cherry growing zone of Alenquer.)** [English and French summaries ¾ p. each.]
Bol. Junta nac. Frut. Lisbon, 1950, **10**: 33-118.
Growing cherries at Alenquer [in Portugal] is described in relation to the area under cherries and its agroclimate, varieties grown there and their characters, and commercial and marketing aspects. Growing cherries in association with vines is considered to be more economical than growing vines only.

3238. Krüssmann, G.
Beiträge zur Kenntnis der Quittensorten, *Cydonia oblonga* Mill. **(A note on the quince, *Cydonia oblonga*.)**
Dtsch. Baumsch., 1951, **3**: 14-18, 51-4, 77-80, 108-13, 133-6, 143-5, bibl. 7, illus.
Notes are given on the history of *Cydonia oblonga*, its morphology, varieties, propagation, cultivation, rootstock value, utilization of the fruit, and diseases.

3239. Amaral, J. D.
As frutas e os produtos hortícolas Portugueses no Brasil. **(Portuguese fruits and horticultural products in Brazil.)** [English summary ½ p.]
Bol. Junta nac. Frut. Lisbon, 1950, **10**: 224-308.
Brazil has a decided preference for products exported from Portugal, particularly for fruits and vegetables. A study of the Brazilian market for these products is set out, with reference to grapes, melons, chestnuts, hazel nuts, walnuts, figs, potatoes, garlic, onions, olives and preserved fruits. It is considered that there is room for expansion.

Varieties and breeding.

(*See also* 3182, 3183, 3229c, 3312i, t.)

3240. Potter, J. M. S.
Report of the National Fruit Trials 1921-1950. Part I and Part II.
J. roy. hort. Soc., 1951, **76**: 240-52, 280-93.
An up-to-date summary is presented of the behaviour of the most promising varieties of apples, pears, plums, cherries, black and red currants, raspberries, strawberries, gooseberries and blackberries which have undergone trial for a period sufficient to give some indication of their commercial possibilities. The scope of the trial, which was fully described in the 1921-44 report [see *H.A.*, 16: 43], is not detailed here again, but appendixes previously given relating to flowering periods and pollination of a number of apple, pear and plum varieties have been revised.

3241. Žavoronkov, P. A.
New winter-resistant varieties of apple in the Urals. [Russian.]
Sad i Ogorod, 1951, No. 6, pp. 11-14.
The author describes his work carried out at the Čeljabinsk horticultural research station with the object of raising varieties of apple suitable for the climatic conditions of the Urals where the winters are particularly harsh. He raised 196 seedlings and from them selected 22 as new varieties, which are here named and briefly described. He puts them in 3 categories: (1) varieties with small fruits, mostly hybrids of the small-fruited Siberian crabs crossed with commercial varieties; these proved particularly hardy, (2) winter-resistant varieties with larger fruit (weight 25-50 g.) and of better flavour, and (3) varieties with fruits of 60 to 160 g. and of good quality.

3242. Johansson, E.
Några värdefulla fruktsorter under prövning vid statens trädgårdförsök. **(Some valuable fruit varieties under trial in Sweden.)**
Sver. pomol. Fören. Årsskr., 1950, **51**: 221-36, bibl. 19, illus.
Deals with foreign apple and pear varieties under trial by the Experimental Horticultural Service in Sweden.

3243. Evreinoff, V. A.
La pêche Madame Evreinoff. **(The peach variety Madame Evreinoff.)**
Rev. hort. Paris, 1951, **123**: 367, illus.

This French variety, obtained from a sport of Mayflower in 1930, is little known in France but is extensively grown in Italy and Hungary. It is an abundant cropper; the fruit ripens at the end of June, travels exceptionally well, and can be kept for 40 days in cold storage.

3244. Rodžabli, A. D.
Varieties of medlar in Azerbajdžan. [Russian.]
Sad i Ogorod, 1951, No. 1, pp. 30-2.
The medlar is grown on a large scale in certain regions of the Azerbajdžan republic. The tree and its fruit are described. The fruits of wild medlars have sugar and malic acid contents up to 10% and 1·17% respectively, compared with 17·3% and 0·20 to 0·89% for cultivated varieties. The fruits of seven of the best varieties are briefly described.

3245. Ortega Nieto, J. M.
Olivos de semillas. Sus posibilidades en la obtención de variedades selectas. **(Olives from seed. The possibility of obtaining varieties of good quality.)** [French summary ½ p.]
Bol. Inst. Invest. Agron. Madrid, 1949, **9**: 317-363, bibl. 8, illus.
Olive trees obtained from seeds of known varieties show great variation, indicating the hybrid composition of the parents. The trees, the fruit of which has been studied, are, in general, similar to adult trees of cultivated varieties. Though losses in the progeny obtained were rather high, certain parent varieties yielded more seedling varieties of good quality than others. Very encouraging results were obtained as regards oil content of the seedlings, some of which are superior in this respect to the best cultivated varieties.—Estación de Olivicultura, Jaén.

3246. Reimer, F. C.
A genetic bud mutation in the pear.
J. Hered., 1951, **42**: 93-4.
A bud mutation appeared on a tree of the Bartlett pear in Washington in 1938. The mutation, which has been named Max-Red Bartlett, produces reddish shoots and leaves and dark red fruit, similar in other respects to that of Bartlett. It comes true to type from buddings, and extensive breeding experiments have shown that the mutation is genetic. Open pollinated seed produced 43·7% red seedlings, while Max-Red Bartlett × Comice produced 56% red seedlings. The seedlings have not yet fruited, and only a small proportion of them are as vigorous as Bartlett seedlings. Open pollination of a red mutation of Beurré Hardy has also produced a high percentage of red seedlings.

3247. Šaĭtan, I. M.
The effect of the age of the flowers on the results of crossing with closely related and distantly related peaches and apples. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **78**: 1025-8.
It was found that the best results were obtained when pollination was effected from 3 to 5 days after the flowers were emasculated.

3248. Danielsson, B.
Embryokulturer av stenfruktträd. **(The embryo culture of stone fruit.)** [English summary 7 lines.]
Sver. pomol. Fören. Årsskr., 1950, **51**: 200-6, bibl. 8, illus.
The methods described by Tukey (*H.A.*, 5: 188) and Lammerts (*H.A.*, 12: 764) were used at the Swedish Fruit Breeding Station, Balsgård, for culturing cherry embryos. A cross of Rivers Early with an early local variety yielded the highest number of living plants, viz. 72 out of 192 embryo cultures, the total yield of 8 crosses being 106 plants from 638 cultures.

3249. Gilmore, A. E.
A technique for embryo culture of peaches.
Hilgardia, 1950, **20**: 147-70, bibl. 11, illus.
Studies on embryo culture have been made over several years at the California Agricultural Experiment Station with the object of finding a rapid survey method of testing the effects of peach root extracts and other substances on the growth of peach seedlings. A technique is described, the salient feature of which is a " sterilization " procedure on dry, dormant peach seeds, followed by the maintenance of aseptic conditions during the subsequent after-ripening. Merthiolate 1: 2,000 in 50% alcohol was found to be suitable for the purpose. Various factors influencing the growth of peach-embryo cultures are discussed and two growth disorders, tip die-back and " curly root ", are described. Suggestions are made for a standardized technique for growing peach-embryo cultures to be used for biological testing.

3250. Hochapfel, H.
Keimphysiologische Versuche mit E 605 forte bei Obstsaaten. **(Physiological tests with E 605 forte on germinating fruit seeds.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 96-8.
Reference is made to the use of tetrazol staining in seed germination tests, the phytochemical reaction being the reduction of the salt to the red water-insoluble triphenylformazan by viable seeds. The author considers that the test can also be used for determining the degree of injury in seeds caused by trace elements and by plant protection preparations, and describes a method for testing apple seeds treated with E 605 forte [a thiophosphoric acid ester preparation].

Rootstocks and propagation.

(*See also* 3164, 3312n, s, 3898.)

3251. Herrero, J.
Studies of compatible and incompatible graft combinations with special reference to hardy fruit trees.
J. hort. Sci., 1951, **26**: 186-237, bibl. 71, illus.
When the work here described was started, there was no known method of forecasting the compatibility of a graft combination. Since incompatibility is sometimes overcome in practice by the use of an intermediate stem-piece of a variety compatible with both scion and rootstock, trials of double-grafted pear and plum trees with intermediate stem-pieces were designed. Their object was to discover whether the time and amount

of vegetative growth, the internal structure of the plant stems, the structure of the graft unions or the distribution of starch, were related to the compatibility of the graft combination. Further studies were made in a trial of single-grafted peach trees on two rootstocks, one of which was compatible and one incompatible with the scion variety. Neither the type of vegetative growth nor the beginning of cambial activity in spring appeared to be directly associated with the causes of incompatibility. No connexion appeared to exist between compatibility and the features of the stem structure examined. The structure of the graft unions, however, the condition of the inner bark above and below the union and the distribution of starch in the different parts of the trees were found to be related to compatibility. [From author's synopsis.]—East Malling Research Station.

3252. KARNATZ, H.
Die Eignung niederelbischer Lokalsorten für die Anzucht von Obstunterlagen. **(Local fruit varieties of the lower Elbe region suitable for rootstocks.)**
Mitt. ObstbVersuchsring Jork, 1951, **6**: 18-21.

Observations made in seedling plantations [in Altenland, Germany] have shown Myrobalan to be the most suitable rootstock for plums and prunes, Graham's Jubilee for apples, and Lange Winterbirne for pears. No outstanding rootstock was found for cherries; seedlings derived from selected *P. avium* mother trees appear to be the most suitable so far.

3253. FOURY, M.
Petite contribution à l'étude des porte-greffes East-Malling en Provence. **(A small contribution to the study of East Malling rootstocks in Provence.)**
Rev. hort. Paris, 1951, **123**: 466.

Brief notes are given on the performance of the apple rootstocks M.I, II, IV and X on rich, alluvial soil in an irrigated nursery in Provence.

3254. HILKENBÄUMER, F.
Zur Frage der Unterlagenwahl bei Apfelspindeln. **(Rootstock selection for apple spindle-bushes.)**
Dtsch. Baumsch., 1951, **3**: 104-8, illus.

A discussion on rootstocks for spindle-bushes with tabulated data showing the behaviour of 21 apple varieties on E.M. IX and of 7 varieties on various clonal rootstocks at Prussendorf near Halle, Germany.

3255. BUDAGOVSKIĬ, V. I.
The effect of soil flooding on the development of the root system of apple dwarfing rootstocks. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **72**: 1147-50, bibl. 7, illus.

A trial was carried out in an orchard of a Crimean state farm with Orleans Reinette as the scion variety, and rootstocks III and V [presumably the "East Malling" numbers]. The orchard was flooded twice, from a river, the first time in January, the second 11 June to 5 July. Trees on III remained uninjured but those on V were damaged to various degrees, the leaves showing marginal scorch and the first order roots dying. Another trial included II, III, V and IX, hybrid and woodland apple rootstocks, and *Prunus mahaleb* (a drought-resistant rootstock for acid cherries). It was found that the rootstocks could be put in 3 categories with reference to their response to flooding, viz. resistant (including III), intermediate (including II, V and IX), and least resistant (including Mahaleb).

3256. TALBERT, T. J.
Budding and grafting standard apple varieties on hardy stocks.
Bull. Mo. agric. Exp. Stat. **525**, 1949, pp. 24, illus. [received 1951].

Studies at the Missouri Agricultural Experiment Station indicate the need, especially in North and Central Missouri, for the use of hardy intermediate apple stocks to prevent winter injury to the trunks and scaffold branches. Although conclusive data on the performance of such topworked trees are not available, it is generally considered that they are longer lived and are more vigorous, uniform and productive than trees without a hardy intermediate. The intermediates, moreover, tend to root above the union and so improve the anchorage. Hibernal and Virginia Crab have both proved satisfactory as intermediates. Most varieties worked on Virginia Crab outyielded the same varieties on Hibernal, but Mammoth Black Twig and Stayman gave better results on Hibernal. Methods of topworking are described in detail and costs are estimated. Information is also given on frameworking, selection and care of scion wood, and making and applying grafting wax.

3257. MAURER, K. J.
Vorläufiger Bericht über einen Stamm- bzw. Gerüstbildnerversuch. **(A preliminary report on a stem and frame builder trial.)**
Züchter, 1950, **20**: 346-52.

The 3 chief requirements in an apple stem builder are (1) compatibility, (2) frost hardiness and (3) vigorous, straight growth. So far (2) and (3) have not been combined in one variety. Filewicz, from his extensive experience at Sinoleka, Poland, advocated Antonowka on grounds of hardiness, whereas Hilkenbäumer rejects it because of its poor performance in the nursery. In pursuance of earlier experiments carried out at Sinoleka the author compared the nursery behaviour of Antonowka with that of 12 other varieties, submitting numerous data from a small-scale trial. Variation in height and diameter was considerable with all varieties tested, and Antonowka proved to be more uniform than some others. By far the highest degree of uniformity was shown by *Malus prunifolia* Sikora, type I.—Geisenheim Research Station.

3258. MÜLLER, H.
Pillnitzer vegetativ vermehrte Birnenunterlagen. (2. Mitteilung.) **(Vegetatively propagated Pillnitz pear rootstocks. (2nd communication.)*)**
Züchter, 1950, **20**: 352-6, bibl. 3, illus.

Earlier work had shown that seedlings of *Pirus betulifolia* are particularly suitable for vegetative propagation as pear rootstocks and 38 clones are being studied at the

* For first communication, see Festschr. 25 Jahre Versuchs- u. Forschungsanst. f. Gartenbau Pillnitz/Elbe, 1947/48.

Horticultural Research Station, at Pillnitz near Dresden. A method, reported here, has now been worked out for the commercial propagation of the rootstock. The suckers in the stoolbed are earthed up in " the usual way " [presumably in spring and summer] and cut in the late autumn. They are then kept in a cellar during the winter and planted out in beds in the spring, about 5 cm. deep. Here root formation is profuse, being induced by etiolation. Tests with worked clones have so far shown (1) no instance of incompatibility, (2) good anchorage, (3) vigorous growth combined with early bearing. The rooting of the clones is illustrated by photographs and tabulated data.

3259. Mosse, B., and Herrero, J.
Studies on incompatibility between some pear and quince grafts.
J. hort. Sci., 1951, **26**: 238-45, bibl. 4.

Single, double and " ring-grafted " trees were used to study the way in which two compatible graft components (Conference pear and Quince A) may react to the introduction, either as rootstock or intermediate, of a third variety (C8 pear) which made satisfactory trees with strong unions when single-grafted with Conference. In all combinations examined Quince A tissue invariably had a thinner bark than either Conference or C8. Unions of Conference on C8 were mechanically more perfect than those of Conference on Quince A. Poor tree performance was frequently associated with abnormal starch distribution, particularly lack of starch in the root system. Symptoms usually associated with incompatible trees were produced in compatible single-grafted trees by the introduction of a bark ring of a third variety into the stock stem. Ring-grafted trees were more incompatible than double-grafted trees having the same rootstock and scion, and an intermediate of the ring-graft variety. Reversing the position of intermediate and rootstock greatly affected the performance of the Conference scion, which made satisfactory trees when single-grafted on either as a rootstock.—East Malling Research Station.

3260. Lagaude, V.
Les possibilités du poirier dans le midi par l'affranchissement. (**The advantages of scion rooting in pear orchards in the south of France.**)
Rev. hort. Paris, 1951, **123**: 460-1, illus.

The use of dwarfing quince rootstocks and other measures to control the vigour of pear trees results in a falling off of production after about 10 years. Provided the trees are planted sufficiently far apart, their vigour may be renewed after the first few years by earthing up above the union and thus inducing scion rooting. In the south of France the soil is too dry and light for this. Very satisfactory results, however, have been achieved there with Dr. Jules Guyot by planting trees on quince stock with the union 15-20 cm. below the surface. During the first few years the effect of the rootstock was observed in the early bearing and high quality of the fruit, while later vigour was maintained as a result of scion rooting. It is thought that most early pear varieties grown in the south of France could be treated in this way, with the exception of Beurré Giffard. The method should not be used on heavy or shallow soils without preliminary trials.

3261. Trusevic, G. V.
Peach as a rootstock for plums. [Russian.]
Sad i Ogorod, 1951, No. 5, pp. 18-20.

The author comments on the recommendation that peach be used as a rootstock for plums, and gives data for trials with seedling peaches and cherry plum (*Prunus cerasifera*) as rootstocks for two varieties of plum. The cherry plum seedlings gave a much better stand of nursery trees than peach.

3262. L., G. K.
Encore la question du mirobolan. (**The myrobalan problem.**)
Progr. agric. vitic., 1951, **136**: 70-1.

The author reports serious losses from incompatibility of apricot scions on myrobalan rootstocks, the scions breaking away at the union when the trees are 8-10 years old; he advises the use of other rootstocks, especially in regions exposed to high winds.

3263. Miller, E. J., and others.
Studies on the development, preparation, properties and applications of wax emulsions for coating nursery stock and other plant materials.
Tech. Bull. Mich. agric. Exp. Stat. **218**, 1950, pp. 78, bibl. 19, illus.

An account is given of the work done at the Michigan Agricultural Experiment Station during the last 18 years on the preparation and uses of wax emulsion sprays to reduce transpiration. In 1930, new emulsifying agents became available which made possible the preparation of stable dilute wax emulsions, and this fact stimulated the development and testing of many such preparations. The first emulsion successfully used on dormant nursery stock consisted of paraffin wax 8·6%, ammonium linoleate emulsifier 2·6%, bentonite 2·6%, and water 86·2%. This preparation, known as Dowax, markedly reduced transpiration while allowing a limited degree of respiration, and extensive trials indicated its value for coating deciduous or evergreen ornamental and fruit nursery stock at the time of transplanting, coating evergreens to prevent winter windburn, coating Christmas trees to prevent needle fall, coating cut stems of chrysanthemums and roses to retard wilting, and coating apple, pear, banana and citrus fruits to prolong storage life. Under certain conditions, however, the preparation caused direct foliage injury, and further study led to the development of formulae for oil or wax-oil emulsions which are effective in reducing water loss from plants for short periods (2-3 days) without apparent injury. It has recently been found that certain wax-oil emulsions, applied to cherry or apple trees during fruit development, significantly increase the size of the fruit.

3264. Correa de S. Castelo Branco, A.
Vegetative propagation by root cuttings.
Nature, 1951, **168**: 125-6, bibl. 1.

In an attempt to propagate *Lagerstroemia indica* by root cuttings three treatments were compared in December 1949: Exposure of the cuttings to (1) 0–2° C. for 14 days, (2) a dry atmosphere (50% relative humidity) for 7 days, and (3) as in (2) but for 14 days. The cuttings were then planted upright in a rooting medium of sand and garden soil. After 3 months 82%

rooting occurred in cuttings treated according to (2), while the other two treatments yielded a poor percentage and the controls 42%. In a second experiment cuttings were taken of *Pyrus communis* sub-sp. *boreana* and of *L. indica* late in March, a season not commonly used for this type of propagation. After a month and a half, 70% rooting was recorded in *Pyrus* cuttings previously submitted to treatment (3), as against 48% for treatment (2) and nil for treatment (1) and the controls. With *Lagerstroemia*, treatment (2) again gave the best results. From these observations it is concluded: (*a*) Better rooting of root cuttings of these plants is obtained, due to interception of the polar transportation of auxins by means of dehydration. (*b*) When polar transportation of auxins is intercepted, the rooting process becomes independent of the season in which the cuttings are planted. (*c*) These conclusions offer an explanation of the observation that the best results with root cuttings are generally obtained in the open air and not in greenhouses.—Instituto Superior de Agronomia, Tapada da Ajuda, Lisbon.

3265. GISEVIUS, R.
Beitrag zur Wurzlingsvermehrung bei Apfelgehölzen. **(Propagation of apple trees by root cuttings.)**
Züchter, 1950, **20**: 296-302, bibl. 3, illus.

The production of successful root cuttings decreased with the age of the mother tree, the decrease being somewhat slower in clonal rootstocks than in seedlings. Good soil conditions (cold frame) improved the development of the cuttings, but treatments with Belvitan, a proprietary growth substance, or a nutrient solution showed no advantage. Cuttings taken from ungrafted seedlings were better than those taken from grafted ones. Deep planting had an adverse effect on growth. Root-cuttings from young seedling mother trees developed in the nursery as well as those from clones.

3266. EGOROVA, V. I.
Propagating cherries by soft-wood cuttings.
Sad i Ogorod, 1951, No. 5, pp. 22-5, illus.

To compensate for the lack of nursery material in the central zone of the U.S.S.R. trials have been conducted at the Moscow plant breeding station with soft-wood cherry cuttings. All the varieties tested could be rooted in this way, but there was great variation from one year to another. The percentage rooting for 10 varieties in 1950 ranged from 54·1 in the variety Zaharovskaja to 1·3 in Jubileinaja. Rooting is stimulated by the use of indolylbutyric acid at 0·005% or heteroauxin at 0·02% for 10 to 12 hours. The cuttings are planted in frames and later in well-manured trenches.

3267. MACHERAUCH, O.
Die erste Obstsamenspende-Anlage, ein bedeutsamer Fortschritt für Obstbau und Baumschule. **(The first fruit seed producing plantation, a significant advance in fruit growing and nursery work.)**
Dtsch. Baumsch., 1951, **3**: 31-4.

Information is given on the establishment of a 25 ha. fruit plantation in Germany for the sole purpose of providing seed for rootstocks. Basic investigational work making such a nursery possible was done by workers at the Hanover and Jork stations.

3268. KARNATZ, H.
Der Einfluss der Saatdichte auf die Rentabilität der Obstsämlingskultur. **(The rate of sowing in fruit seedling production.)**
Dtsch. Baumsch., 1951, **3**: 70-3.

The data presented show that the best spacing for seed of the two most popular apple varieties used as rootstocks in Germany (Grahams Jubilee in the north, Trierer Weinapfel in the south) is 8 cm. apart in the row with 20 cm. between rows.

3269. KARNATZ, H.
Einige Hinweise zum Verschulen von Obstsämlingen. **(Notes on transplanting fruit seedlings.)**
Mitt. ObstbVersuchsring Jork, 1951, **6**: 45-6, illus.

The vigorous and healthy appearance of the seedling nurseries at the Fruit Experiment Station, Jork, Germany, apart from selected planting material, is attributed to (1) use of new land, (2) early, i.e. mid- to end of March, planting, (3) wide spacing, with a minimum of 10 cm. between plants in rows 30 cm. apart, and (4) intensive plant protection.

Pollination.

3270. CUTHBERTSON, J. D., AND STICKLEY, R. M.
Report on a trial of a new method for controlled pollination.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 31-6, bibl. 1.

Schanderl's experiments in Germany during the war led the Long Ashton workers to test for themselves the possible use of vaseline in place of paper or muslin bags to protect flower stigmas in controlled pollination work. They describe the methods used for trees in pots and bush trees in the open. They found that vaseline seems to reduce pollen viability and sometimes fruit set, but note that there are distinct advantages in not subjecting flowers to an artificial bag climate. They consider that the vaseline method merits further study.

3271. ZANON, K. W.
Befruchtungsbiologische Untersuchungen an Südtiroler Apfelsorten. **(Pollination biology of the apple varieties of South Tyrol.)**
Züchter, 1950, **20**: 267-75, bibl. 8, illus.

The flowering period of all 14 varieties examined coincided sufficiently to allow of reciprocal pollination. Only 3 triploid varieties, i.e. Gravenstein, Canada Reinette and Winesap, showed inadequate pollen germination; in all the others (probably diploid) it was adequate for pollination. The diploids were, however, practically self-incompatible. Cross pollination trials showed the great majority interfertile, a few partially interfertile (½ of normal setting), and only one combination, Canada Reinette × Köstlicher, intersterile. Kalterer Böhmer appeared to be an exceptionally good pollinator for most varieties.

3272. TATARINCEV, A. S., AND SOKOLOVA, E. P.
The significance of the perianth for the germination of pollen grains. [Russian.]
Priroda, 1951, **40**: 1: 67-8.

Evidence is reviewed, with reference to fruit plants, which confirms the advantage of leaving the perianth

intact on flowers from which the anthers are removed in hybridizing experiments. It is suggested that the perfume from the petals hastens the germination of the pollen grains.

3273. JORDAN, R.
Kleine biologische Studie vom Fächeln der Bienen. **(A biological study of the fanning of bees.)** [English summary 4 lines.]
Mitt. Klosterneuburg, 1951, **1**: 14-17, illus.
Two types of fanning are described, viz. (1) for ventilation of the hive and (2) to give off scent at the entrance for the guidance of returning bees.

Growth phenomena.

(*See also* 3312q.)

3274. KEMMER, E.
Beitrag zur Frage der "Jugendform" bei Apfelgehölzen. **(A contribution to the problem of "juvenile" forms in apple trees.)***
Züchter, 1950, **20**: 302-5, bibl. 8, illus.
In this paper Kemmer adduces further evidence (*H.A.*, 18: 868 and 20: 2348) for his view that no fixed "juvenile" form exists in apples, as has been postulated by Fritzsche (*H.A.*, 18: 1626). Two of the microphotographs reproduced are sections of the wood of EM. XIII shoots, one from the so-called "juvenile" phase of a stooled plant and the other from a "mature" form, but there is no difference in anatomical structure. Of special interest are the sections of two 2-year-old shoots issuing from the same branch of a seedling and showing the characteristic dense structure of the wood. One of the shoots bore an inflorescence before the second annual ring was completed, the other was sterile. Since the first annual ring of both shoots had a similar structure, it is concluded that dense wood formation and lack of conducting vessels cannot be responsible for the delay in flowering, as has been suggested by Fritzsche. Apparently, the number of vessels present is no criterion of the developmental phase of a shoot but is related to its length. Many other observations also do not fit into Fritzsche's system. Thus: Two 6-year-old clonal plants, which were obtained from a seedling after the completion of its first year, flowered for the first time in 1950. The untreated tree formed 3 inflorescences on its outer branches, i.e. in the "mature" zone just beginning to develop, whereas the treated tree (quince bridge) had 256 inflorescences. Of these 58 were formed on spines, some of them close to the base of the stem, i.e. certainly within the "juvenile" zone. Many other photographs are presented in this well documented paper to show that the "characteristics" of the two developmental phases are interchangeable, at least temporarily. After the first year sterility can be overcome in the "juvenile zone", and in varieties, i.e. in the "mature" zone, it is possible to produce shoots very similar in appearance to those of a young seedling.—Inst. f. Obstbau, Berlin.

3275. PETRAHILEV, I. M.
Abnormal apple flowers. [Russian.]
Bot. Zurnal, 1951, **36**: 305-6, illus.
A brief note describes abnormal apple flowers seen in an experimental garden at Minusinsk (Siberia) in 1949 on the variety Papirovka. The flowers had an increased number of petals as a result of the transformation of the reproductive organs into petals, while the sepals were changed into leaves of various sizes.

3276. BIEDERMANN, H.
Parthenokarpie als Ursache missgestalteter Birnenfrüchte. **(Parthenocarpy as the cause of badly shaped pears.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1951, **3**: 57, bibl. 3.
A suggestion that the deformation observed on the pear Comtesse de Paris [see *H.A.*, 20: 2580] was due to parthenocarpy is followed by a brief discussion on fruit pollination.

3277. MINERBI, G.
Partenocarpia da gelate delle pere. **(Frost parthenocarpy in pears.)**
Not. Mal. Piante, 1950, No. 12, pp. 25-30, bibl. 2, illus.
Parthenocarpy of pears, particularly the variety Passe Crassane, was observed at Porporana (Ferrara) after severe frosts on 9 and 10 April, 1949, which caused blackening of pistils and stamens and loosening of the epidermis of the calyx.

3278. LUCKWILL, L. C., AND WOODCOCK, D.
A preliminary investigation into the nature of the hormone produced by developing apple seeds.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 23-30, bibl. 8.
As the result of their work with seeds of Laxton's Superb, Crawley Beauty and Miller's Seedling apples the authors have established certain properties for the active hormone which occurs in the endosperm and to a lesser extent in the embryo of the developing apple seed: "The hormone is acidic in nature; it is stable to heat but is destroyed by hydrolysis with strong acid or alkali, and loses its activity on keeping for one to two months. It is soluble in ether and water, and apparently, to a limited extent, in petrol ether. In seed which has been dried at 100–120° C. it is present in two forms: 'free' hormone which can be removed by ether extraction, and 'bound' hormone or precursor, which readily yields free hormone when the seeds are placed in cold or hot water. In the seed samples investigated more than one half of the total hormone present was in the form of precursor. The precursor is insoluble in ether and petrol-ether. From its chemical and physiological properties it is concluded that the hormone cannot be identical with indolylacetic acid."

Fertilizers and soil management.

(*See also* 4118.)

3279. BOYNTON, D., AND OTHERS.
Responses of McIntosh apple orchards to varying nitrogen fertilization and weather.
Mem. Cornell agric. Exp. Stat. **290**, 1950, pp. 35, bibl. 10.

* Translation available on application to this Bureau.

Two McIntosh apple orchards in New York were given differential nitrogen treatment for a period of 6 years, and detailed observations were made on yield, fruit quality and growth in order to discover a reliable way of assessing the N nutrition of the trees. Differences in climate controlled the degree to which N supply affected the variables measured in each orchard. In neither orchard was productivity increased significantly by applications of more than 1 lb. N per tree, but the yield of trees given ½ lb. N per tree was usually below maximum. Trees fertilized with less than 1 lb. N per tree produced fruit with most colour and firmness and best keeping quality. The differences in yield and fruit quality were associated with differences in growth, and in size, colour and N content of leaves. Leaf colour appeared to be a useful index of N response. Increase in girth and shoot growth varied with size of crop as well as with N level. N level influenced the concentration of P, K, Ca and Mg in the leaves. It may partly determine the predisposition of apple trees to visible symptoms of deficiency in those elements.

3280. Godnev, T. N., Sudnik, N. C., and Syubarova, E. P.
The application of fertilizers to fruit trees by spraying with a balanced nutrient solution. [Russian].
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 835-6, bibl. 5.

Favourable results are recorded from spraying plum and pear seedlings with a balanced fertilizer solution (composition given) at 10-day intervals from 10 July to 20 September.

3281. Stiller, —.
Die Ergebnisse der Boden- und Blattuntersuchungen als Grundlage für die Düngung der Obstanlagen. **(Orchard fertilization based on results of soil and leaf analyses.)**
Mitt. ObstbVersuchsring Jork, 1951, **6**: 21-3.

A discussion on the nutrient status of the Altenland orchard soils, with fertilizer recommendations for apples, pears, cherries, plums and prunes.

3282. Luchetti, G., and Tallachini, M. E.
Anomalie di colorazione delle mele e rapporto potassio/sodio. (Nota riassuntiva preliminare.) **(Anomalies of coloration in apples in relation to the ratio K/Na. (Preliminary note.))**
Not. Mal. Piante, 1950, No. 12, pp. 30-5, bibl. 14.

This is a study of the influence of the K/Na ratio on the poor colouring of apples grown in the province of Ferrara. From the results of fruit analyses it was found that the ratio was highest in the Belluno province, lowest in Mantua and intermediate in Ferrara. This variation in the ratio is due to different amounts of Na present, which indicates that the absorption of Na by the fruit or at least its transference thither does not hinder the accumulation there of K. The presence of approximately equal quantities of K in the three provinces leaves unexplained the poor colour of the apples of Ferrara in relation to K. Some other factor may have an effect, possibly the relatively high chloride content of soil and fruit.

3283. Natividade, J. V.
A cultura fruteira e os novos métodos de defesa contra a erosão. **(Fruit growing in relation to new methods of preventing soil erosion.)** [Summaries in English and French 8 lines each.]
Bol. Junta nac. Frut. Lisbon, 1950, **10**: 7-15, illus.

To prevent erosion, and thus improve the soils on steep slopes, the planting of fruit trees on terraced drainage banks is found to be advantageous.

3284. Dominik, T.
Badania mykotrofizmu dzikich Grusz na terenie Polski z uwzględnieniem warunków bioekologicznych. **(Studies on the mycorrhiza of wild pear trees in their various biocenoses in Poland.)**
Acta Soc. Bot. Polon., 1950, **20**: 255-303, illus., from abstr. in *Rev. appl. Mycol.*, 1951, **30**: 234-5.

Studies of mycorrhiza of wild pear trees growing in different parts of Poland in relation to the ecological conditions of the soil and the plant associations showed that ectotrophic mycorrhiza were found in 18%, and were constantly associated with woodland conditions or with soils that had been fallow for some time. A method for the propagation of biologic races of pear trees adapted to certain soil types is proposed.

3285. Higgins, K. B.
Green manure crops.
J. Dep. Agric. Vict., 1951, **49**: 78, illus.

Cover crops help to prevent soil erosion in a heavy rainfall district, whereas in a flat district, where waterlogging of the soil may be a problem in wet seasons, they remove a considerable amount of water from the soil. Leguminous plants such as tick beans, blue lupins and Dun peas are the most suitable green manure crops in orchards. Sowing for these crops should be at the rate of 1½ bushels per acre, 2 cwt. of superphosphate being used with the crop. On acid soils, lime at the rate of 2 tons of ground limestone per acre will improve growth.

3286. Berman, I., Avellaneda, M., and Trione, S.
El empobrecimiento de los suelos mendocinos cultivados con manzanos. **(The impoverishment of apple soils in Mendoza.)** [English summary 7 lines.]
Rev. Fac. Cien. agrar., 1949, **1**: 67-70, bibl. 5 [received Dec. 1950].

It is calculated that the amount of nutrients lost to the soil in Mendoza in the form of exported or processed apples during 1945-48 was 357·65 tons N, 96·50 tons P_2O_5 and 525·88 tons K_2O.

Pruning.

(*See also* 3312h, l, 4085.)

3287. Natividade, J. V.
A poda e a produtividade das fruteiras. **(Pruning in relation to the productivity of fruit trees.)** [English summary 8 lines.]
Bol. Junta nac. Frut. Lisbon, 1950, **10**: 197-209, illus.

Fruit growers are warned of the damage caused by heavy dormant pruning, particularly in heading back young trees.

3288. JARRETT, R. M.
A comparison of pruning treatments in relation to the shape and yield of apple trees.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 37-48, bibl. 6, illus.

A continuation of work described in the 1937 Report. Differences in varietal response are noticeable, thus Allington and Cox produce ultimately bigger crops when treated as modified leader trees, but the reverse is true of Worcester. Observations on Allington, Early Victoria, Edward, Cox and Worcester show that differences in crop yield due to regulated and summer pruning become evident in the early years, but differences due to shape do not appear till later. In Early Victoria and Allington tree shape does not affect the biennial bearing habit. On Early Victoria summer pruning slightly reduces it, while on Allington "regulated" pruning induces a higher degree of biennial bearing than the other pruning treatments.

3289. JACOBONI, N.
Sull'applicazione di alcune moderne direttive nella potatura dell'olivo. **(On the application of some modern methods in pruning olives.)**
Ann. Fac. Agrar. Perugia, 1948, **5**: 104-34, bibl. 4, illus. [received 1951].

The author reviews previous recommendations for methods of pruning olives with particular reference to the part played by the young shoots in tree development. He then describes his own observations on the anatomy of the shoots, branches and sub-shoots, the setting of the fruit and fruit drop, ash content of branches and leaves and the chemical constitution of the ash (P, K and Ca), and discusses the implications of his observations.

Ringing.

3290. VALLEGGI, M.
Osservazioni sull'influenza dell'incisione anulare sulla produzione delle olive da tavola. **(Notes on the effect of ringing on the olive crop.)**
Olearia, 1951, **5**: 19-23.

A note of the successful ring barking of the young branch of a 20-year-old Ascolana table olive in the Research Station grounds at Pescia. The set of olives on the branch was very good and the olives developed extremely well. Further trials are indicated.

Spraying for cultural purposes.

(*See also* 3317.)

3291. BATJER, L. P., AND HOFFMAN, M. B.
Fruit thinning with chemical sprays.
Circ. U.S. Dep. Agric. **867**, 1951, pp. 46, bibl. 43.

From a comprehensive survey of experimental work and commercial practices with apples, pears, peaches, apricots and plums the following conclusions are drawn: Dinitro chemicals and naphthaleneacetic acid have proved the most satisfactory, sodium dinitro cresylate and dinitro-ortho-cyclohexylphenol being the most extensively used dinitro compounds. With apples dinitro sprays should be applied as near full bloom stage as possible, and with stone fruit a day or two ahead of full bloom. Concentration must depend on environmental factors, excessive quantities sometimes leading to foliar injury. Weather during blooming is most important, cool humid conditions increasing the effectiveness of the spray. Overthinning is less likely to occur when trees are of normal or above normal vigour. Naphthaleneacetic acid or its sodium salt is applied as a post-blossom spray to apples with greater latitude in timing, thus enabling initial fruit set to be determined more closely before spraying. In the north-western United States the dinitro materials were found more satisfactory than naphthaleneacetic acid, while in certain mid-western and eastern areas the reverse held good. The use of naphthaleneacetic acid thinning sprays on stone fruits is still in the experimental stage. Other chemicals for thinning apples are also mentioned.

3292. FRITZSCHE, R.
Weitere Mitteilung zu den Versuchen zur Behebung der abwechselnden Tragbarkeit bei Apfelbäumen mit Hilfe von Spritzmitteln. **(Further communication on trials to control biennial bearing of apples by means of sprays.)**
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 207-11, illus.

The successful thinning trials carried out in 1950 [see *H.A.*, 21: 198] with α-naphthaleneacetic acid had a marked effect on the 1951, off year, blossoming. Treated halves of apple trees produced little to abundant blossom, depending on variety, while no flowers were observed on the untreated control halves. Further trials are necessary before recommendations can be made, but at least it was found that α-naphthaleneacetic acid can be added to the second post-blossom spray.

3293. RAKITIN, JU. V., AND KRITSKAJA, L. M.
Delaying the opening of buds of fruit trees by applying chemical preparations. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **76**: 295-7, bibl. 4.

The potassium salt of α-naphthaleneacetic acid was found to be effective in delaying the opening of apple and pear buds. The most favourable time for applying it—to get results the following year—is at the end of the growing period of shoots, in these experiments in the first or the second half of July, depending on the species and variety. The optimum concentration was 250-500 mg. per litre.

3294. ZIMMERMAN, P. W., HITCHCOCK, A. E., AND KIRKPATRICK, H., Jr.
Killing of leaves and defoliation of plants by chemical means.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 231-3.

Results of trials with apples, peaches, beans, roses and other woody plants indicate that undecylenic acid and monochloroacetic acid in the concentration range of

0·5% to 3·2% have defoliating properties. The effectiveness of the substances depends upon the species, the formulation, and the concentration. Their uses as selective herbicides and as blossom thinners, especially for apple, are also considered.

3295. ARNDT, E.
Erfahrungen bei der Gehölz-Entblätterung mit Kalkstickstoff. (Defoliation with calcium cyanamid.)
Dtsch. Baumsch., 1951, **3**: 145-6.

Apples, pears, sour cherries, peaches, plums, prunes and standard gooseberries were successfully defoliated in a nursery near Lake Constance by an application of 0·75 to 1 kg. calcium cyanamide in powder form per 40-45 trees.

3296. STROGONOV, B. P.
Growth substance for controlling preharvest drop in apples and pears. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 601-4, bibl. 7.

Under the climatic conditions of the Crimea and Tajikistan, successful prevention of preharvest drop in experiments with 5 varieties of apple and 5 of pear was obtained by spraying the trees with α-naphthaleneacetic acid.

3297. BÖMEKE, H.
Wie benutze ich die Hormonmittel zur Verhinderung des Fruchtfalls ? (Hormone applications to prevent fruit drop.)
Mitt. ObstbVersuchsring Jork, 1951, **6**: 86-8, illus.

Experiences gained at the Fruit Experiment Station, Jork, Germany, with proprietary hormone preparations used on apples, pears and plums and prunes to prevent fruit drop are outlined.

3298. HOFFMAN, M. B., AND EDGERTON, L. J.
New harvest spray.
Amer. Fruit Gr., 1951, **71**: 6: 14, 26-7.

Experiments carried out in 1949 and 1950 with 2,4,5-trichlorophenoxyproprionic acid (TCPPA) showed this hormone at 10 p.p.m. to give as good a control of pre-harvest drop in McIntosh and other apple varieties as did NAA at 20 p.p.m., and to have a much longer period of effectiveness than NAA. The stimulatory influence of TCPPA on ripening and colour development is also noted. Comparative data on the action of the two sprays and on the temperatures obtaining at the time of treatment are tabulated.—New York State agric. Exp. Stat.

Grading, storing and processing.

3299. GASTON, H. P., AND LEVIN, J. H.
Grading apples in the orchard.
Quart. Bull. Mich. agric. Exp. Stat., 1951, **33**: 310-19, illus.

A description is given of a mobile apple grader, developed in Michigan, consisting of a feed belt, an eliminator section, a sorting belt and a filling station. The moving parts are driven by a 1 h.p. petrol engine. The entire assembly is mounted on 3×4 in. skids, is 14 ft. long and weighs approximately 450 lb. It was designed primarily for orchard use, but is also convenient for use indoors.

3300. WALKER, W. F.
The selection and presentation of fruit [pears, and particularly apples] for export.
Tasm. J. Agric., 1951, **22**: 31-9, illus.

Notes are given on the selection of fruit, variety, grade and stage of maturity at packing in relation to a successful export trade. The adoption of one suitable type of container and the packing of "Extra Fancy" and "Fancy" grades in central packing sheds are recommended. Incorrect packing and unsuitable cases are illustrated. Systems of packing are described.

3301. PADFIELD, C. A. S.
The effect of periods of pre-storage delay on the ground-colour and cool-storage disorders of Granny Smith apples. I. Superficial scald.
N.Z. J. Sci. Tech. Sect. A, 1949 (issued Dec. 1950), **31**: 4: 40-8, bibl. 10.

Experiments with Granny Smith apples extending over three seasons have indicated that: (1) Pre-storage delay was not a practical means of controlling superficial scald in this variety. (2) One of the factors limiting the practicability of this treatment was excessive yellowing induced by delay in storage. (3) Immature fruit developed scald more readily than mature fruit. (4) Packing in oiled wrappers gave an economic control of the disorder. [Author's summary.]

3302. SMOCK, R. M., AND GROSS, C. R.
Studies on respiration of apples.
Mem. Cornell agric. Exp. Stat. **297**, 1950, pp. 47, bibl. 38.

A number of preharvest, prestorage and storage factors which affect the aerobic respiration of apples were studied from a practical point of view. The following were among the findings reported. In general varieties with a short storage life had a higher climacteric peak than medium or long storage varieties, and the decline in respiration rate following the peak was more rapid. Potential storage life of a given variety could not be correlated with the steepness of the climacteric rise nor with the total amount of CO_2 given off during the marketable life of the apple. Duchess apples from the inner part of the tree respired faster after harvest than apples from the outer part of the tree, but the reverse was true for McIntosh. In a given year large fruits respired faster than small ones, while in another year the reverse was true, a fact which emphasizes the necessity for using fruit of the same size in respiration studies. In McIntosh apples normal abscission began at about the same time as the respiratory rise in the fruits. Applications of naphthaleneacetic acid or 4,chloro-o-toloxyacetic acid accelerated the climacteric rise of McIntosh apples, the effects being more apparent at 74° F. than at 33° F. There were indications that nitrogen fertilization and urea sprays increased the respiration rate. Bruising at harvest time increased the respiration of several varieties, but not that of Rome Beauty, although in this case the softening rate was accelerated. No effect of relative humidity was observed on apple respiration after harvest. Mercury vapour accelerated the climacteric rise of Wealthy apples. It is pointed out that heat-of-respiration values should be based not only on temperature but also on variety, age, and possibly other factors.

3303. KIDD, F., AND OTHERS.
Metabolism of malic acid in apples.
J. hort. Sci., 1951, **26**: 169-85, bibl. 18.
After gathering there is a delay of varying length during which the amount of acid in apples remains unchanged. Later it decreases at a rate proportional to the concentration of acid present. The rate constant of acid loss does not change appreciably with the stage of growth. The rate constant of acid loss of Worcester Pearmain is about twice that of Bramley's Seedling apples. The loss of acid, which takes place in gathered fruit, is considered to be due to decarboxylation which does not require the presence of free oxygen. The formation of acid on the tree is considered to be due to a process requiring the presence of oxygen, and to be linked with the systems involved in cell wall formation. —Univ. of Cambridge.

3304. HULME, A. C., AND SWAIN, T.
Organic acids of the apple fruit.
Nature, 1951, **168**: 254, bibl. 3.
The authors extracted from young apple fruits a new carboxylic acid, the presence of which had hitherto not been suspected. Its chemical characterization will be described elsewhere.—Ditton Lab., East Malling, and Low Temperature Research Station, Cambridge.

3305. KIESER, M. E., AND POLLARD, A.
The effect of fruit storage on apple juice processing.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 188-93, bibl. 9.
The most marked effect of fruit storage found was a decrease in acidity of the juice. In Bramley's Seedling, a very acid variety, the effect is beneficial, but in the other varieties tested either a loss of juice quality has resulted or increased formation of storage deposits in the juice. These difficulties are considered in some detail. Further tests on other culinary varieties are being undertaken to determine how far acidity reduction can be allowed to proceed before processing difficulties are likely to arise.

3306. CRANG, A., KENDALL, L., AND STURDY, M.
A comparison of some varieties of fruit preserved by bottling, canning and freezing. Progress report I.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 197-207, bibl. 2.
The results of tasting tests on 24 varieties of soft fruits and pears preserved by bottling, canning and deep freezing are given, also on 12 varieties of plums preserved by bottling and canning. The frozen fruit was generally superior to the heat-processed fruit in colour, but frequently inferior in texture or flavour. The best method of preserving varies considerably from one kind of fruit to another. [Authors' summary.]

3307. SKARD, O., AND WEYDAHL, E.
Sammenlikning av dypfrosne og hermetiske plommer. **(A comparison of frozen and canned plums.)**
Frukt og Baer, 1950, **3**: 70-7, being *Meld. Inst. Fruktdyrk. og Fruktkonserv. Norges Landbrukshøgsk.* **10**, 1949.
Data are presented on the quality of frozen and canned plums of many varieties processed in 1944, 1946 and 1947. Reine Claude Althanns ranked 1st in freezing and 5th in canning, Reine Claude d'Oullins 3rd in canning and 5th in freezing and Hackmann 1st in canning and 4th in freezing. Victoria was very satisfactory for both processes in 1946, when the fruit was well ripened on the tree, but poor in 1944 and 1947. Czar and Rivers Early Prolific gave products of inferior quality.

3308. SKEPPER, A. H., AND DAVISON, J. R.
Dehydration of fruit.
Agric. Gaz. N.S.W., 1950, **61**: 505-10, 594-7, 625-30, 655; 1951, **62**: 23-7, 87-91, 125-8, 196-8, bibl. 10, illus.
This is a series of articles on the dehydration of fruit, covering: (1) the general principles of dehydration, (2) the control of heat and humidity, (3) types of dehydrator, (4) types of plant in use in New South Wales, (5) harvesting and preparing prunes for dehydration, (6) dehydration of fruit other than prunes, (7) drying shed lay-out.

3309. DRIED FRUITS PROCESSING COMMITTEE.
Dehydration of apricots, peaches.
J. Dep. Agric. S. Aust., 1951, **54**: 349-52, bibl. 2, illus.
Food Pres. Quart., 1950, **10**: 59-63.
As a result of 5 years' work by C.S.I.R. workers D. McBean and J. Shipton at Homebush, techniques have been developed which give a product superior to the conventional sun-dried article. The article describes the raw material, preparation of the fruit, blanching, sulphuring, dehydration and post-drying treatment.

3310. KESSLER, H.
Das Einfrieren von Kirschen, eine zusätzliche Massnahme zur nutzbringenden Verwertung der Ernte. **(Quick freezing of cherries.)**
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 230-2, bibl. 2.
In Switzerland many cold stores originally erected for meat and only partially utilized at present are suitable for quick freezing cherries and their subsequent storage. The initial freezing is carried out at −25° to −30° C. and the fruit is then stored at −15° to −20° C. The varieties found most suitable in trials at Wädenswil were those with firm flesh.

3311. SCHMILL, M. M.
Nuovo procedimento di concia delle olive . . . **(A new method of pickling both green and black olives, and a note on an olive picker.)**
Olearia, 1950, **4**: 428-9.
The method proposed for pickling black olives consists in putting the olives into tubs filled with salt water, to which wine vinegar and beet syrup (table or fodder beet) has been added, and leaving them there for a fortnight at a temperature not lower than 55-60° F. They are next transferred to other tubs where they are stratified in alternate layers of salt for 2 to 3 weeks. They are then ready for the market and can, without more ado, be stored in oil, or oil and vinegar, or vinegar. Green olives should be immersed for 24 hours in salt water to which vinegar has been added. Repetition may be necessary to fix the colour for certain varieties or early in the season. Once the colour is fixed the olives

can be left in a salt bath for a fortnight, when the water is replaced by fresh salt water and the olives left for a further 3 weeks. Most of them are then ready for market, though some varieties will need another similar 3-week period.

Noted.

3312.

a ANJOU, K.
Yrkesfruktodlingen i Sverige. **(Commercial fruit growing in Sweden.)**
Sver. pomol. Fören. Årsskr., 1950, **51**: 241-74, 4 maps.
At the request of the Swedish Pomological Society.

b BARKER, B. T. P.
An investigation on the yeast flora of Kingston black ciders. Part II.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 178-87, bibl. 2.

c BEECH, F. W., AND CHALLINOR, S. W.
Maceration and defecation in cider-making. I. Changes occurring in the pectin and nitrogen contents of apple juices.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 143-60, bibl. 20.

d BORGSTRÖM, G.
Äpplet i världshushållet. **(The apple in world economy.)**
Sver. pomol. Fören. Årsskr., 1950, **51**: 114-30.

e BURROUGHS, L. F., AND CHALLINOR, S. W.
The mechanism of the control of fermentation of ciders by centrifuging.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 161-77, bibl. 8.

f CHANDA, S. K., HIRST, E. L., AND PERCIVAL, E. G. V.
The constitution of a pear cell-wall xylan.
J. chem. Soc. Lond., 1951, pp. 1240-6, bibl. in text.

g ELAGIN, I. N.
Growth and development of wild Caucasian pear (*Pyrus caucasica* A. Fed.) under various environments. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **74**: 823-5, bibl. 2.

h FARLEY, A. J., CHILDERS, N. F., AND CHRIST, E. G.
Pruning bearing apple trees.
Ext. Bull. Rutgers Univ. Coll. Agric. N.J. **258**, 1951, pp. 8, illus.

i GAYFORD, G. W.
Deciduous fruit trees: varieties suitable for planting [in Victoria].
J. Dep. Agric. Vict., 1951, **49**: 161-4.

j GENTILE, G.
Il pesco in Campania. **(The peach in Campania.)**
Ital. agric., 1951, **88**: 289-92.

k GIORDANO, B.
Contributo alla storia dell'olivo. **(A brief history of the olive from the ninth century B.C. till now.)**
Humus, 1951, **7**: 4: 29-32, illus.

l MARINUCCI, M.
Dettagli di potatura dell'olivo. **(Methods of pruning the olive.)**
Humus, 1951, **7**: 5: 14-15, illus.
Three methods are described.

m PÅHLMAN, A.
Våra herrgårdsträdgårdars bidrag till det svenska fruktsortimentet. **(The contribution of Swedish manor house gardens to the country's fruit varieties.)**
Sver. pomol. Fören. Årsskr., 1950, **51**: 155-71, illus.

n RANDHAWA, G. S.
Degree of compatibility of rootstock and scion with particular reference to deciduous fruit trees.
Indian J. Hort., 1951, **8**: 2: 22-6, bibl. 40.
A literature review.

o RIVERS, T. H.
Growing fruit trees in pots.
North. Gdnr, 1950, **4**: 295-9, illus.
Commercially for exhibition purposes, by amateurs for decoration.

p SCHMID, W.
Bodenbearbeitungsmaschinen für Wein- und Obstbau. **(Implements for mechanical soil cultivation in viticulture and fruit growing.)**
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 110-20, illus.

q SCHNEIDER, H.
The anatomy of peach and cherry phloem.
Bull. Torrey bot. Club, 1945, **72**: 137-56, bibl. 22, illus. [received 1951].

r SONESSON, N.
Sveriges Pomologiska Förening 50 år. **(50 years Swedish Pomological Society.)**
Sver. pomol. Fören. Årsskr., 1950, **51**: 17-108.

s TALBERT, T. J.
Propagation of fruit trees by budding and grafting.
Circ. Mo. agric. Exp. Stat. **343**, 1950, pp. 16, illus.
Information on growing peach and apple stocks from seed is included.

t VALLEVIK, G.
Maibaerdyrking i Hardanger. **(May Duke cherry growing in Hardanger, Norway.)**
Frukt og Baer, 1950, **3**: 65-9, bibl. 4, illus.

u VALSET, K.
Planlegging av ein salsfrukthage. **(Planning the lay-out of a commercial orchard [in Norway].)**
Frukt og Baer, 1948, **1**: 47-65, illus. [received 1951].

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 3173, 3218, 3240, 3357b, c, d, 3674c, 4093, and annual report section.)

3313. TUCKER, B. D. A.
Fruit growing in the eastern counties [of England].
Agriculture, Lond., 1951, **58**: 186-90.

A short account is given of present acreages, varieties and methods of cultivation of fruits in the eastern counties of England. The region is responsible for more than half the country's strawberries and nearly half the gooseberries and black currants. The acreages under raspberries and dessert apples are increasing.

3314. HILL, H. E.
The cultivation and analytical data of black currants and raspberries in Tasmania.
J. Sci. Food Agric., 1951, **2**: 347-50, bibl. 4.

Practically the whole soft fruit industry in Tasmania is concentrated within 40 m. of Hobart. Raspberries and black currants, of which 4,500 t. and 2,500 t. respectively are produced annually, thrive on a wide range of soils at altitudes from sea level up to 2,000 ft., provided the situation is sheltered. The chief raspberry varieties are Red Antwerp and Lloyd George, those of blackberries Whitebud, Goliath and Tough's Champion. Methods of harvesting and conditions of transport are described, and chemical analyses of the fruit made during the 1948, 1949 and 1950 seasons are presented.

3315. BOULD, C., AND CATLOW, E.
A manurial experiment on blackcurrants. Progress Report, III.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 49-54, bibl. 3.

The effect of manurial treatment on leaf nitrogen, crop and pruning weights of the black currant varieties Cotswold Cross and Mendip Cross in the 1946-1950 seasons is recorded. The availability of N in nitro-chalk and meat and bone meal when used on an equivalent N basis is similar, and higher than that in farmyard manure and composts. The order of yields follows closely the leaf nitrogen status.

3316. KIESER, M. E., POLLARD, A., AND TIMBERLAKE, C. F.
The effect of manurial treatment on the composition of blackcurrants.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 194-6, bibl. 2.

In the present tests on Cotswold Cross and Mendip Cross a general tendency is again disclosed for a low N status of the bushes to be associated with higher ascorbic acid and *vice versa*, some of the differences being significant. The figures for sugar and pectin follow those for ascorbic acid. There is some indication that additional K manuring may favour increased ascorbic acid.

3317. KENNARD, W. C., TUKEY, L. D., AND WHITE, D. G.
Maleic hydrazide to delay blossoming of fruits.
Progr. Rep. Pa agric. Exp. Stat. **52**, 1951, pp. 8, bibl. 24.

The diethanolamine salt of maleic hydrazide with Orthex wetting agent, sprayed on black raspberries in the spring at concentrations of 50 to 1,000 p.p.m., delayed blossoming for 7 to 18 days and delayed picking for 5 to 20 days. The delay was proportional to the concentration of maleic hydrazide used. Low concentrations did not appreciably reduce the yield, size or quality of the fruit, or permanently damage the plants. The addition of a wetting agent appeared to increase the activity of maleic hydrazide. On red raspberries concentrations of 500-2,000 p.p.m. temporarily inhibited vegetative development and delayed blossoming and fruit maturation in proportion to the concentration used. The degree of delay varied with the varieties. The lower concentrations caused little visible injury. Soil applications of maleic hydrazide to dormant peach, cherry and apple trees had no apparent effect. Pre-blossom sprays on peach, apple and plum at 6,000 p.p.m. did not delay bud opening, but caused early abscission of flowers and fruits and injury to the leaves. Summer sprays on Northern Spy apple trees inhibited terminal growth and stimulated lateral growth; new spur-like shoots developed on otherwise bare limbs. Injection into the branches of fruit trees did not generally delay flowering. The translocation of maleic hydrazide through woody tissues appeared to be limited and did not occur uniformly.

3318. BELL, R. C.
Mechanical raspberry harvesting.
Amer. Fruit Gr, 1951, **71**: 5: 16, 30-1, illus.

A popular account is given of the development of raspberry picking machines in Washington State. With the " Two-Force Berry Harvester ", operated by one man and a boy, 35 to 50 13-lb. flats can be harvested in an 8-hour day compared with an average of 8 flats for a good hand picker. The berries are shaken by hand on to a sloping catching board and collected in containers underneath. Compared with hand picking fewer berries are damaged and the sample produced is more uniform. The " Zabroski Steel Terrier " is a larger, power-driven machine, which, operated by 2 men in preliminary trials, harvested 47 30-lb. crates in 3 hours. The two machines are described briefly and illustrated. In both cases the canes require special training.

3319. THORSRUD, J.
Identifisering av de mest vanlig dyrka jordbaersortene. **(The identification of the more commonly grown strawberry varieties.)**
Frukt og Baer, 1950, **3**: 49-54, bibl. 1, illus.

The three new Danish varieties Freja, Rubin and Ydun are among the seven varieties discussed.

3320. JOHANSSON, E.
Indra—en ny jordgubbssort från Alnarp. **(Indra, a new strawberry variety from Alnarp.)** [English summary ½ p.]
Sver. pomol. Fören. Årsskr., 1950, **51**: 237-40, illus.

A description is given of the new Alnarp strawberry variety Indra, a selected clone from a cross of Southland with the Swedish variety Luna. Indra is medium-early, of normal size and conical shape and has a

pleasant flavour. In a two-year trial at Alnarp it out-yielded the other varieties tested, giving a crop of 1·42 Kg/m² per year.

3321. Ljones, B., and Thorsrud, J.
Foreløpig melding om sortsforsøk med jordbaer. **(A preliminary report on strawberry variety trials.)**
Norsk Hagetid, 1950, **66**: 223-4, being *Meld. Jordbaerutvalg*. **1.**
The trials, which included three new Danish varieties, were carried out at the Norwegian Agricultural College, Vollebekk, and at the Horticultural Research Station, Kise. Yield data are presented for 1950 and observations on quality are recorded.

3322. Lineberry, R. A., and Burkhart, L.
Degree of calcium saturation of soil in relation to growth and calcium content of strawberry plants.
Soil Sci., 1951, **71**: 455-66, bibl. 16, illus.
From the results tabulated it is evident that both the degree of Ca saturation and the total Ca in the soils are factors affecting the growth and Ca content of strawberry plants.

3323. Judkins, W. P.
Sprinklers for berries.
Amer. Fruit Gr, 1951, **71**: 6: 9, 18-19, illus.
Deals with the benefits of strawberry irrigation in terms of yield increases and profits. The water requirements of the crop and the cost of sprinkler irrigation are also discussed.

3324. Morrison, W. W.
Preparing strawberries for market.
Fmrs' Bull. U.S. Dep. Agric. **1560,** revised 1950, pp. 16, bibl. in text, illus.
The methods of picking, grading, packing, inspection, shipping and selling which are considered efficient in the various strawberry producing areas of the United States are described.

Vines.

(*See also* 3312p, 3357e, 4152 and annual report section.)

3325. Kisakürek, H.
Grapes: their botany and culture in Anatolia.
[Turkish with German summary.]
Ziraat Fakültesi Yayinlari, Ankara Univ. **21,** 1950, pp. 206, bibl. 42, illus.
The ecological conditions of Anatolia are suitable for vine-growing, and the climate of the region is transitional between that of the Mediterranean countries and of continental countries. In this region there are 6 forms of vine-growing, viz. (*a*) vines alone, (*b*) vines and olives, (*c*) vines and pistachios, (*d*) vines and figs, (*e*) vines with various fruit trees, and (*f*) vines with fruit trees along the headlands. Cultural methods, varieties, yields and marketing are discussed.

3326. Baĭkov, G. K.
The grapevine in Baškir. [Russian.]
Priroda, 1951, **40**: 5: 65-6, illus.
The difficulties of viticulture in the Bashkir Republic are associated with the short summer, early autumn frosts, and very low temperatures, with but little snow, in winter. Variety trials are being carried out and special cultural methods are being tried, such as a layering method to produce young plants which will fruit the first year. A list of varieties recommended for trial is given.

3327. Talbert, T. J.
Grape growing in Missouri.
Circ. Mo. agric. Exp. Stat. **346,** 1950, pp. 28, illus.
All aspects of cultivation, including pest and disease control, are dealt with. Concord is the principal variety grown and the single-trunk Kniffin system of training, which is described in detail, has proved most satisfactory. Trials have shown that Ferbam gives excellent control of black rot and causes less spray damage than bordeaux mixture; it is recommended for use except in areas where downy mildew is serious.

3328. Shaulis, N.
Cultural practices for New York vineyards.
Ext. Bull. Cornell agric. Exp. Stat. **805,** 1950, pp. 47, illus.
The grapes grown are selections from natural crosses or hybrids of native species with *V. vinifera*. In recent years from 65% to 70% of the crop has gone into juice, from 15% to 20% into wine and about 15% has been sold as fresh fruit. Concord is much the most important variety. The whole process of cultivation in New York State is here set out and details are included of pruning with shoots drooping—4-arm Kniffin, Umbrella Kniffin and 6-arm Kniffin, and with shoots upright—Chautauqua, Keuka high renewal and Fan. Notes are given on the characters of some 20 odd varieties suitable for general or home use.

3329. Inglez de Sousa, J. S.
Evolução e sentido da viticultura Paulista. **(The development of viticulture in the state of São Paulo [Brazil].)**
Rev. Agric. Piracicaba, 1950, **25**: 381-96, maps.
The history of vine growing in São Paulo is traced from the first plantings of the European vine by the Jesuit colonists in about 1532, through a period of 300 years when *vinifera* vines were grown successfully but only on a domestic scale for wine-making, to the introduction of the American variety Isabel in the mid-nineteenth century. Thereafter *labrusca* varieties were almost exclusively grown, the industry expanded and the number of pests and diseases increased until about 30 years ago, when the *vinifera* varieties were successfully re-introduced. This time they were grown mainly for the table grape industry, which the author considers has great possibilities in São Paulo.

3330. Regel, C.
An der Nordostgrenze des Weinbaus. **(On the northern boundary of viticulture.)**
Züchter, 1950, **20**: 275-82, bibl. 16.
The author considers that the northern limit of viticulture has not yet been reached in Europe, and advocates the expansion of vine growing in Latvia, Lithuania and White Russia. Mainly dessert varieties are produced in these northern outposts, but possibilities exist for growing varieties suitable for wine making. Breeding of frost-tolerant varieties, such as those of Mičurin, special cultural practices, and trials

of varieties with a short growing season are means suggested to achieve this.

3331. MARIMAN, G.
Viticulture en plein air. Chronique de l'année 1950. **(Open air vine growing in Belgium. Observations in 1950.)**
Courr. hort., 1951, **13**: 156-8, 199-201, 258-60, 302-6, 354-6, bibl. 3, illus.
The author's observations in a number of Belgian vineyards are recorded. Lists of Italian, French, Spanish and Russian varieties are given and interesting varieties not yet introduced into Belgium are mentioned. Reference is made to R. B. Brock's report on trials in England [*H.A.*, 20: 2417], Russian trials are outlined, and an account is given of viticulture in the Belgian Congo.

3332. RODRIGUES, A.
Études ampélographiques au Portugal. Sur l'organisation du registre ampélographique. **(Studies of the Ampelidaceae in Portugal. On the organization of a register of the Ampelidaceae.)**
Agron. lusit., 1948, **10**: 321-42, bibl. 13, illus. [received 1951].
This is an introduction to a systematic study of varieties of vines based on botanical, cultural and economic descriptions, with particular reference to the need for distinguishing rootstock varieties by their biometric characters.—Estação Agronómica Nacional, Portugal.

3333. MÜLLER-STOLL, W. F.
Mutative Färbungsänderungen bei Weintrauben. **(Colour changes in grapes caused by mutation.)**
Züchter, 1950, **20**: 288-91, bibl. 4, illus.
The 3 spontaneous colour mutations in grapes are: (1) The rare appearance of light (green, grey or white) grapes on black varieties; this type of mutation is possibly the origin of white varieties. (2) The more frequent change of light grapes to blue or red; a reversion to the original and natural colour of *Vitis* species. (3) Partial (stripy) or total colour change of berries from green to yellow, comparable to variegation of leaves.

3334. POTAPENKO, JA. I.
Raising frost-resistant vines of good quality. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 2, pp. 26-30, illus.
The chief problem in the viticulture of those regions of the U.S.S.R. where vines have to be covered in winter to protect them from frost is to raise varieties with a short growing period and with a high degree of frost resistance. Methods of solving this problem are discussed, and the characters of ten promising hybrid selections are briefly described.

3335. LYKIN, L. A.
Frost-resistant vines. [Russian.]
Sad i Ogorod, 1951, No. 6, pp. 47-8.
Mention is made of raising frost-resistant vines suitable for cultivation around Moscow. Four varieties recommended as suitable and briefly described are: Rekord, Ispolnin, Uspeh, and Terrasnyĭ.

3336. KUZJMIN, A. JA.
The "Russkiĭ Konkord" vine. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 6, pp. 20-1.
This is a detailed description of the hybrid, Russian Concord, raised by Mičurin by pollinating the variety Concord with a wild Amur vine. It is said to be very vigorous and to produce grapes of good quality. As it is highly frost-resistant, it is widely grown in the northerly viticultural regions of the U.S.S.R.

3337. TITOVA-MOLČANOVA, Z. JA.
The initiation of the primordia of the inflorescences in different vine varieties. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 5, pp. 42-4, illus.
The early stages in the development of the inflorescences in two varieties of grape vine, Saperavi and Ak Kišmiš, have been followed in longitudinal sections of buds, and the data tabulated, for length of axis and number of nodes, from the middle of May to the end of July.

3338. SERGEEVA, V. D.
Grapevine seeds and preparing them for sowing. [Russian.]
Sad i Ogorod, 1951, No. 5, pp. 34-6.
The seeds produced in the more northerly vine-growing parts of the U.S.S.R. are often light and of poor germination capacity. This is discussed in relation to improving germination by ringing branches before flowering and by stratification.

3339. HIDALGO FERNÁNDEZ-CANO, L.
Contribución al estudio de portainjertos. Indices de vigor. **(A study of rootstocks. Characters indicating vigour.)** [English and French summaries 7 lines each.]
Bol. Inst. Invest. agron. Madrid, 1950, **10**: 501-24, bibl. 9, illus.
Nine vine stocks have been examined for vigour by a comparison of weight of shoots, weight and section of stem and index of reserves (of total nitrogen). The importance of necrosis in relation to loss of potential growth was also examined.

3340. BREIDBACH, —.
Die Verwendung von Wuchsstoffen in der Rebenveredlung. **(The use of growth substances in vine grafting.)**
Höfchen Briefe, 1951, **4**: 120-7, illus.
An account of 4 methods of applying Belvitan, a proprietary growth substance, on vine graft unions.

3341. KRAUS, G., AND PRILLINGER, F.
Über die Verwendung von Wuchsstoffen bei der Rebenveredlung. **(The application of growth substances in the grafting of vines.)** [English summary 4 lines.]
Mitt. Klosterneuburg, 1951, **1**: 3-5, bibl. 4, illus.
In commercial vine grafting the appropriate treatmen of the union with growth substances is difficult. A simple new method devised, viz. dipping the basal end of the grafted vine into a 0·02% solution of the potassium salt of α-naphthalacetic acid just before transplanting, was found to be very successful, chiefly because of its beneficial effect on root formation.

Moreover, the take was 10% greater than that of the controls and the union was more uniform.

3342. Naumenko, N. P., and Kostjuk, A. N.
Avoiding the checking effect of transplanting on seedling development. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 2, pp. 31-3, illus.

A method for avoiding "transplantation shock" is described. Vine seedlings were raised in pots made of soil mixed with horse dung in the proportions of 1 to 3, height 7 cm., breadth 8 cm., and the sides 1–1·5 cm. thick. In each pot 1 or 2 seeds were sown 12-25th April at a depth of 1·5 to 2 cm. In May when the plants had 2 or 3 leaves they were planted out, together with the pots, in the nursery. Other details of procedure are described. Such plants began to bear in their third year, thus hastening breeding processes.

3343. Podražanskiĭ, A. L.
Supplementary pollination of bisexual varieties of vine. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 4, pp. 25-9.

Data are presented showing that supplementing the normal pollination of vines which have hermaphrodite flowers by artificial pollination increases the yield. Methods of hand pollination are described.

3344. Bušin, P. M.
The application of fertilizer in irrigation channels in vineyards. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 1, pp. 30-1.

The advantages of applying fertilizer by strewing in the irrigation channels are described, with data showing increased yields over controls and over application in holes 35-40 cm. deep, two per plant.

3345. Lemmon, P. E., Hafenrichter, A. L., and Madson, B. A.
Cucamonga brome: a new grass for cover-cropping.
Circ. Calif. agric. Exp. Stat. **401**, 1950, pp. 7, illus.

In recent tests in southern California this annual brome grass was found to be an excellent cover crop for vineyards. When sown in autumn before the rains and worked down in early spring to leave a surface mulch, the crop will reseed itself indefinitely and will give good protection against erosion. It matures 20-30 days earlier than most cover-crop grasses and may be cultivated before it comes into competition with the vines for moisture.

3346. Podražanskiĭ, A. L.
When to irrigate vines. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 6, pp. 11-13, illus.

Data are given of the results of irrigation trials carried out at the Ukrainian viticultural experiment station in winter, early spring, and summer, the water being supplied from artesian wells and applied in furrows. It is concluded that in arid regions the best results are obtained by irrigating at the beginning of the growing period, particularly on heavy soil. Positive results from autumn or winter irrigation are seen the following year.

3347. Contardi, H. G., and Pimenides, A. C.
Experiencias comparativas con los métodos gravimétrico y volumétrico en el proceso transpiratorio de la vid ("*Vitis vinifera*" L.). **(A comparison of gravimetric and volumetric methods for determining the transpiration rate of the vine.)**
Rev. Fac. Cien. agrar., 1949, **1**: 72 [received Dec. 1950].

The authors point out an error of calculation made in their paper of the above title, published in *Rev. Fac. Cien. agrar.*, 1949, 1: 23-8 [*H.A.*, 20: 1394]. The calculated leaf surface, as measured by the Coradi planimeter, should have been multiplied by 10, thus making the amount of water transpired by each sq. cm. of leaf surface of vine 0·1 cc. in 24 hours.

3348. Contardi, H. G., and Pimenides, A. C.
Cantidad de agua que transpira la vid (*Vitis vinifera* L.), variedad cultígena "Semillón", en Mendoza. **(The amount of water transpired by the Semillón grape vine variety in Mendoza.)** [English summary ⅓ p.]
Rev. Fac. Cien. agrar., 1949, **1**: 41-9, bibl. 12, illus. [received Dec. 1950].

The purpose of this study, carried out at the National University of Cuyo, Argentina, was to determine the amount of water transpired by 1 ha. of vineyard from time of leafing out in the spring to leaf fall in the autumn. The vineyard under observation was planted at the rate of 5,000 vines per ha. and the plants were trained along low wire trellises. The period of active transpiration was 207 days. Average daily transpiration per plant was 4·1 litres. Throughout the whole period, 4,243·5 m³ of water were transpired by 1 ha. of vineyard.

3349. Junta Nacional das Frutas.
Alguns dados analíticos sobre a composição das frutas portuguesas (uvas, laranjas). **(Analytical data on the composition of Portuguese fruits (grapes, oranges).** [English summary 6 lines.]
Bol. Junta nac. Frut. Lisbon, 1950, **10**: 309-38.

This is an account of analyses of Portuguese grapes and oranges, the first results of a study of Portuguese fruits now being made at the Laboratories of the Junta Nacional das Frutas.

3350. Orton, E. C.
Sultana drying. Recent developments and recommendations.
J. Dep. Agric. S. Aust., 1951, **54**: 379-81.

The points discussed in this report are: (1) developments in the cold dip process (oils used in dipping, concentration of potassium carbonate, effect of heating the cold dip mixture, recommended ingredients for the cold dip spray mixtures for cold dipped fruit); (2) bulk hot dipping; (3) control of mould growth fermentation and vinegar fly infestation (sulphuring in a sulphur box, sulphuring on racks, use of fungicides, new sulphite hot dip, sulphite spray mixture, recommendations for combating mould growth on sultanas while drying on racks, and recommendations for combating mould growth fermentation, and vinegar flies).

Nuts.

(*See also* 3357a, 3672, 3956.)

3351. WAHNON, J. S.
Amêndoas portuguesas. Contribuição para o seu estudo analítico. **(Portuguese almonds. An analytical study.)** [Summaries in English and French about ½ p. each.]
Bol. Junta nac. Frut. Lisbon, 1949, **9**: 353-73.

This is a chemical study of 85 samples of almonds from 83 varieties or selections of almond trees grown in Portugal, of which 9 are from the Douro region, the others from Algarve. The fruits of some varieties are very heavy, varying from 7·142 to 8·153 g. The differences in hydrocyanic acid content enabled the varieties to be classified as sweet, semi-sweet and bitter. The almonds from Douro contain less oil than those from Algarve, but they are richer in protein, crude cellulose and soluble ash. The bitter almonds contain more crude protein than the sweet. Sixteen grams of almonds supply 100 calories.

3352. ANON.
Quel avenir est réservé aux châtaigneraies françaises ? **(The future of the French sweet chestnut industry.)**
Rev. hort. Paris, 1951, **123**: 349.

For the last 25 years the Society for Chestnut Reafforestation has been trying to obtain varieties of chestnut resistant to ink disease (*Blepharospora cambivora*), but so far only 2 resistant varieties which are also vigorous and fruitful have been selected from exotic species. A rapid method of vegetative propagation has been developed for multiplying these selections. The industry is now threatened, however, with the introduction of *Endothia parasitica* from Italy and Spain. The solution to the problem of this devastating, apparently incurable, disease also lies in breeding. The most resistant species is *Castanea mollissima*, and, although this is of poor quality both for afforestation and nut production, it is urged that trees of this species showing resistance to *Blepharospora* should be used to produce hybrids resistant to *Endothia*.

3353. PARPIA, H. A. B., AND OTHERS.
Filbert enzymes.
Abstr. in *Econ. Bot.*, 1951, **5**: 204 of paper in *Chemurgic Digest*, 1950, **11**: 12: 9.

The surplus filbert crop of Oregon may find a new outlet in the recent discovery that proteolytic enzymes obtained from these nuts improved the flavour of American cheese, not by imparting any filbert nut flavour but by better aging the cheese. [Authors' abstract.]

3354. EVREINOFF, [V. A.].
Sur l'introduction de *Corylus heterophylla* ou noisetier de Sibérie dans l'arboriculture française. **(The introduction of *Corylus heterophylla*, the Siberian hazel, to French horticulture.)**
Rev. hort. Paris, 1951, **123**: 395, also reprinted in *Courr. hort.*, 1951, **13**: 293.

The common hazel nut (*Corylus avellana*) is very little grown in France as it flowers so early, January or February, that the flowers are usually damaged by spring frosts. Of the 25,000 quintals of hazel nuts consumed annually, 24,000 are at present imported. It is suggested that more could be produced in the country, if the Siberian hazel (*Corylus heterophylla* Fischer) were grown. In its native district (N.E. China and eastern Russia) it flowers about April. The leaves remain on the tree during the winter and fall only after the flowering period, thus giving considerable protection to the flowers. The shell of the nut is very thick and hard and affords almost complete protection against attacks of *Balaninus nucum*. The bushes are very adaptable as regards soil, but they do best on moist, rich, well-drained soil in a sunny position. They seldom grow more than 2 m. high and should be planted at 3 m. apart each way. The plantations should be clean cultivated. Pruning consists in cutting out weak or badly placed branches.

3355. ČUHNO, D. F.
Walnut growing in the Ukraine. [Russian.]
Sad i Ogorod, 1951, No. 1, pp. 27-30.

The qualities of the walnut as a decorative tree on collective farms and in parks, as a woodland tree and for preventing erosion on steep slopes are mentioned. In the Ukraine it is grown chiefly in the south-western regions. About 10 different kinds can be distinguished, varying in size, shape of head, size of fruit, thickness of shell, oil content of nut, etc. The possibilities of extending its cultivation northwards are discussed with particular reference to frost resistant varieties.

3356. OZOL, A. M.
Osmotic pressure in the leaves and one-year-old shoots of species of *Juglans*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **74**: 623-6, bibl. 2.

This is a study of the osmotic pressure and refractive index of plant sap, and the water content of leaves and one-year-old shoots in relation to winter resistance in species of *Juglans*. Determinations were made for material from *J. mandshurica*, *J. cinerea*, *J. nigra*, and three varieties of *J. regia* having different degrees of resistance to cold. A positive relation between osmotic pressure and winter resistance was found, and the level of osmotic pressure corresponded to the refractive index of the sap.

Noted.

3357.

a FERAUGE, M. T.
La greffe du noyer. **(Grafting walnuts.)**
Bull. hort. Liège, 1950, **5** n.s.: 314-22, from abstr. in *Ann. Gembl.*, 1951, **57**: 58.

b HIBBARD, A. D., AND HEMPHILL, D. D.
Success with strawberries.
Bull. Mo. agric. Exp. Stat. **542**, 1950, pp. 30, illus.
Practical advice to commercial growers in Missouri on varieties, cultivation and marketing.

c JOHNSTON, S.
Problems associated with cultivated blueberry production in Northern Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1951, **33**: 293-8, illus.

d JOHNSTON, S.
The Keweenaw [highbush] blueberry: a variety for trial in Northern Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1951, **33**: 299-301, illus.

e KNAPPSTEIN, R. O.
Contour planting of vineyards.
J. Dep. Agric. S. Aust., 1951, **54**: 407.
Methods and advantages detailed.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 3228 l, 3492e, i, y, and annual report section.)

3358. GARCÉS O., C.
El control de las enfermedades de las plantas mediante la inmunización. (**Control of plant diseases by immunization.**)
Rev. Fac. nac. Agron. Colombia, 1950, **11**: 111-39, bibl. 59.
An account is given of the nature of disease resistance in plants and of the problems involved in obtaining resistance or immunity by selection and breeding, examples being given of the results achieved with various horticultural crops.

3359. HANSEN, H. R., AND OTHERS.
Plantesygdomme i Danmark 1948. Årsoversigt, samlet ved Statens plantepatologiske Forsøg. (**Plant diseases and pests in Denmark 1948.**) [English summary 12 pp.]
Tidsskr. Planteavl, 1950, **54**: 1-61.
Many diseases and pests of fruit, vegetables and ornamentals are discussed in this annual survey by the Danish Plant Pathological Service, which includes records of less common species and physiological disorders.

Disturbances of nutrition or of unknown origin.

(*See also* 3157, 3158, 3492j.)

3360. REID, R. D.
June yellows in Auchincruive Climax strawberries.
Grower, 1951, **35**: 1160-3, bibl. 5, illus.
" June yellows " in Climax plants.
Fruitgrower, 1951, No. 2894, pp. 1056-7, bibl. 5, illus.
The disorder known as " June yellows " was observed in a few plants of Auchincruive Climax in May-June of 1950 and 1951. In both cases the yellowing of the foliage began to disappear in early July and the plants recovered completely after a period during which the leaflets showed some distortion. Soil investigations and the grafting of affected plants on *F. vesca* confirm conclusions reached in the U.S.A. that the observed condition is not due to an infective disease but to some form of genetical instability.—Scottish hort. Res. Inst.

3361. WYND, F. L., AND BOWDEN, R. A.
Response of chlorotic blueberry bushes to a very insoluble iron-containing glassy frit.
Lloydia, 1951, **14**: 55-7, bibl. 3, illus.
Blueberry bushes growing in Georgia on a clay loam soil with a pH value of 5·2 exhibited symptoms of extreme Fe deficiency. When a very insoluble, finely powdered, glassy frit containing 5% Fe_2O_3 was mixed with the upper 12 in. of soil, the leaves gradually recovered their full green colour, as shown by Kodachrome photographs taken 194 and 445 days after treatment, and reproduced in colour.

3362. HARRIS, W. B.
Copper deficiency of fruit trees.
J. Dep. Agric. S. Aust., 1951, **54**: 277-9, illus.
Die-back and leaf scorch of pear trees growing on white sand at Sandy Creek, S. Australia, were found to be due to a multiple mineral deficiency in which copper was the chief limiting factor. Responses were obtained to copper, zinc, and manganese, and the symptoms of each deficiency are briefly described. It seems that copper deficiency is unlikely to cause trouble in South Australian orchards owing to the widespread use of copper sprays.

3363. BOULD, C., AND TOLHURST, J.
A note on boron in relation to bitter pit in apples.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 54-6, bibl. 3.
Mulder in Holland recently produced evidence indicating that bitter pit is due to late boron deficiency and internal cork to early boron deficiency [*H.A.*, 18: 1723]. Attempts to eliminate bitter pit by soil application of borax, by injection of boric acid into the branches, and by borax foliage sprays in Grenadier apple at Long Ashton in 1950 were entirely unsuccessful, although the foliage spray did increase threefold the boron content of sound fruits.

3364. LJONES, B.
Magnesium-mangel hos frukttre. (**Magnesium deficiency in fruit trees.**)
Frukt og Baer, 1950, **3**: 78-89, bibl. 22, illus., being *Meld. Inst. Fruktdyrk. og Fruktkonserv. Norges Lantbrukshøgsk.* **11**, 1949.
A review of the literature with some data on soil analyses and experiments carried out at the Norwegian Agricultural College.

Climatic factors.

(*See also* 3241, 3257, 3277, 3334, 3335, 3354, 3355, 4103.)

3365. LEVITT, J.
Frost, drought, and heat resistance.
Annu. Rev. Plant Physiol., 1951, **2**: 245-68, bibl. 81.
The author's earlier review on frost resistance only was published in 1941 [*H.A.*, 15: 918]. He now deals with resistance to drought and heat also because the evidence shows that the development of resistance to one of them usually involves an increase of resistance to one or both of the others, in so far as resistance is used in the sense of withstanding or tolerating these phenomena in the plant's tissues. After discussing recent attempts to clarify the position with regard to the three factors

the author concludes that any theory proposed to explain one of them must therefore apply to the others. On this ground he rejects most of those propounded. He considers that Scarth's theory of frost resistance based on a concept of increased protoplasmic hydration is supported by more recent evidence of an increase in soluble proteins during frost hardening and an increase in bound water as a result of " osmotic hardening ".

3366. GRANHALL, I.
De fysiologiska grunderna för fruktträdens köldhärdighet. (**The physiological basis of frost resistance in fruit trees.**) [English summary ½ p.]
Sver. pomol. Fören. Årsskr., 1950, **51**: 281-91, bibl. 31.

In his address to the Swedish Pomological Society the author reviews the literature on the physiology of frost resistance in fruit trees and discusses some of the work in progress at the Balsgård Fruit Breeding Station. The paper concentrates on four causes of frost injury: (1) Late maturing of the cambium and young shoots in the autumn; (2) lack of resistance during the dormant period, mostly responsible for pith and sapwood damage; (3) early bud burst followed by frost; (4) blossom frosts. At Balsgård freezing trials are being carried out on 200 apple varieties with the object of grouping them in 5 classes of winter hardiness. Some new diploid seedlings appear promising, while the 50 tetraploid seedlings tested show a wide range of reaction to low temperature.

3367. LIHNELL, D.
Vinterskadorna på fruktträd och andra kulturväxter år 1947. (**Winter injury to fruit trees and other cultivated plants in 1947.**)
Sver. pomol. Fören. Årsskr., 1950, **51**: 207-16, bibl. 9, 1 map.

An unusual combination of climatic factors—among them lack of a heavy snow cover and the sudden advent of spring—caused the long, though not particularly hard, winter of 1946/1947 to be especially injurious to fruit trees and other plants over wide areas of Scandinavia. Bud burst occurred while the ground was still frozen to a great depth, which resulted in severe drought symptoms and root damage. A map shows the fruit-growing districts affected in Denmark, western Norway, southern Sweden and southern Finland. It is interesting to note that in Sweden (the only country for which it is marked on the map) the northern boundary of winter damage coincides with the line south of which the snow cover did not exceed 10-30 cm. on 31 March, 1947.

3368. OLAFSON, G.
Frostskaden i frukthagane vinteren 1946-47. (**Winter frost damage in Norwegian orchards sustained in 1946/47.**)
Frukt og Baer, 1950, **3**: 94-106, bibl. 6, being *Meld. Inst. Fruktdyrk. og Fruktkonserv. Norges Lantbrukshøgsk.* **13**, 1949.

Tabulated data are presented from a survey of the frost damage sustained by fruit trees in two fruit-growing areas of Norway during the winter of 1946/47, giving details, *inter alia*, on the degree of injury, the variety, the type of rootstock (seedling or dwarfing) and altitude. In experiments carried out by another department of the Norwegian Agricultural College it was found that, for instance, a straw cover of only 4 cm. reduces the depth to which the soil freezes from 48-63 cm. (uncovered) to 12 cm. Certain suggestions are made on the practical application of these results in an orchard.

3369. WITTE, K.
Untersuchungen zur Frage der Frostabwehr durch Beregnung. (**Studies on frost protection by irrigation.**)
Reprinted from *Wasser u. Boden*, 1951, **4**: 1-7, illus.

The experiments were carried out near Bonn, Germany, under the exacting conditions of prolonged autumn frosts in 1949 and 1950, no late frosts occurring in the spring of 1950. In the absence of precision instruments two thermographs were set up 50 cm. above the ground, one on the control plot, the other on the plot irrigated with atomizing nozzles. In each year irrigation was started when the temperature dropped to 0° C. and it was continued until the temperature had risen again to several degrees above zero. On the coldest night the temperature recorded on the irrigated plot in 1949 was −5° C., 4° C. higher than on the control plot. Two types of sprinkler tested were found to afford approximately equal protection, provided the water was evenly distributed onto the plants and consequently the resulting ice cover was uniform. The effect of the treatment varied with the susceptibility of the crop. Runner beans remained uninjured for two nights, but then began to show symptoms of damage until they were killed at the end of the cold period. Tomatoes with green shoots and blossoms suffered no damage to foliage or fruit until after the third night, although the air temperature was −5·2° C. and that of the ground −8° C., but the plants died after the 5th night. Dwarf beans showed only negligible damage up to the 5th night with a temperature of −7·2° C. (air) and −9·9° C. (ground), and a late potato crop with green foliage at the outbreak of frost responded similarly. Tobacco and chrysanthemum were the hardiest plants, surviving an early November frost of −12·5° C. without sustaining damage. In 1950 additional equipment—a rain gun and a so-called slow-rainer—was tested, and additional crops—cucumber and dahlia—were incorporated in the trial. On the whole, the results of the previous season were confirmed, a temperature increase of 3-4° C. being achieved with irrigation. As spring frosts are usually lighter than autumn frosts, it is concluded that normally it will be possible in the spring to protect crops by this method. Much attention was given to the problem of optimum rate of application, which was determined as 1·5 mm. per hour. Hence, only implements with a very low rate of application are suitable. If a rotating type of apparatus is used—in contrast to atomizing nozzles—the rotation must be rapid. Intervals of up to 130 seconds between one fall and the next were found not to affect frost control at temperatures not exceeding −6·6° C., while harder frosts require shorter intervals. The angle of application was also found to be of importance: if it is too high, the water freezes in the air, and if it is too low, the water runs off before it has time to freeze on the

plant. This has the additional disadvantage that the soil is wetted more than necessary, which in turn causes the soil temperature to drop and plant development to be retarded. Trials with nozzles of different apertures are discussed in detail, and data on the performance of various types of apparatus are presented in tabular and diagrammatic form.

3370. Ferraguti, A.
Alterazioni da freddo su foglie di melo nel Ferrarese. **(Damage to apple leaves by frost at Ferrara.)**
Not. Mal. Piante, 1950, No. 13, pp. 5-7, illus.
Blistering and malformation of apple leaves after frost in early April 1950 are described and illustrated. The damage was most marked on the varieties Abundance, Jonathan and King David.

3371. Anon.
Experiments with hormones plus vitamins to prevent frost damage.
Grower, 1951, **35**: 763-4, illus.
A very brief note on experiments made by Hey and Hopf showing Cox's Orange Pippin blossom sprayed with α-naphthaleneacetic acid+vitamin Kb and then exposed to 6° F. frost to set fruit and develop satisfactorily.

3372. Ledesma, N. R.
Consecuencias del frío invernal insuficiente en los árboles de follaje caduco. **(The effects of insufficient winter chilling on deciduous trees.)** [English summary 7 lines.]
Reprinted from *Rev. Fac. Agron. La Plata*, **27**: 181-96, bibl. 13, illus., as *Publ. Dir. gen. Serv. met. nac. Ser. agromet.* **1**, 1950.
The author briefly reviews the literature and summarizes his own observations, made in Argentina, on the effects of insufficient chilling on bud development, flowering, leafing out, fruiting, length of life and yield of deciduous fruit trees.

3373. Ledesma, N. R.
La floración del duraznero y su relación con las temperaturas de invierno y de primavera. **(The flowering of peach and its relation to winter and spring temperatures.)** [English summary ½ p.]
Reprinted from *Meteoros*, 1951, **1**: 73-90, bibl. 20, as *Publ. Dir. gen. Serv. met. nac. Ser. agromet.* **4.**
The effect of winter and spring temperatures on the flowering of 50 varieties of peach was studied at the Institute of Fruit Culture, Faculty of Agriculture, Buenos Aires, during the seasons 1941-42 and 1942-43. The results showed that insufficient winter chilling (number of hours at or below 7° C.) delayed flowering most in the varieties with the highest cold requirements (late varieties), and prolonged the flowering period most in the varieties with the lowest cold requirements (early varieties). The varieties studied are classified according to their cold requirements, and early flowering varieties are recommended for planting in the Buenos Aires district.

3374. Ciferri, R.
Le "macchie d'olio" non parassitarie delle foglie di vite. **(The non-parasitic "oil spot" of vine leaves.)**
Not. Mal. Piante, 1950, No. 13, pp. 65, bibl. 1.
A disorder of vine leaves, referred to as an oil spot, was particularly prevalent in Italy in 1949 and 1950. It is attributed to a deficiency of soil water together with pronounced insolation during very hot days.

3375. Ljones, B.
Solbrann på eple. **(Sun scald of apples.)**
Frukt og Baer, 1950, **3**: 90-3, bibl. 4, illus., being *Meld. Inst. Fruktdyrk. og Fruktkonserv. Norges Lantbrukshøgsk.* **12**, 1949.
In August 1948, sun scald appeared on apples after the hottest days of the summer at the end of July. The mean July temperature was 17·1° C. as against 16·4° C. normally, and 21·4° C. at 2 p.m. as against 20·5° C., with temperatures at 2 p.m. of 27·7°, 29·6°, 28·8°, 28·4° and 28·6° C. from 28 July to 1 August. Bramley's Seedling was one of the three varieties that showed the worst injuries, viz. spots of 3-4 cm. diameter with the tissues killed to a depth of 0·5 cm., while the symptoms occurring on Laxton's Superb and Cox's Orange were more reminiscent of light storage scald. A description is given of the type of damage shown by several other varieties and meteorological data are presented. Characteristic symptoms shown by Bramley's Seedling and Laxton's Superb are among those illustrated photographically.

3376. Prew, H. A.
Sour sap of fruit trees.
N.Z. J. Agric., 1951, **82**: 142, illus.
Sour sap, a physiological trouble occurring in orchards throughout New Zealand, causes the loss of many fruit trees each year. It is associated with poor soil drainage or "wet feet", and may kill the roots before spring growth starts; very often the buds burst and the leaves appear but do not develop to normal size. Effective soil drainage is the only remedy.

3377. Schmidt, H.
Beobachtung über Gasschäden an Obstbäumen. **(Gas damage to fruit trees.)**
Dtsch. Baumsch., 1951, **3**: 10-12.
A description is given of the damage observed on apple, pear, cherry and peach trees, caused by chlorine gas in the Frankfurt a.M. district.

3378. Thomas, M. D.
Gas damage to plants.
Annu. Rev. Plant Physiol., 1951, **2**: 293-322, bibl. 103.
The author discusses the effects of different gases and the mechanism of their action so far as it has been investigated, paying particular attention to sulphur dioxide and fluorine compounds, but not neglecting other halogens and hydrogen halides, nitrogenous compounds, mercury vapour, smog, and certain carbon and sulphur compounds. He considers that "The phytotoxicities of the different gases seem to depend on: (*a*) absorbability, which is related to water solubility and reactivity with the tissues; (*b*) acidity or alkalinity; (*c*) oxidation or reduction reactions;

(*d*) hormonal properties; and (*e*) toxicity of the element itself", and proceeds to expatiate on how this is borne out with the different gases.

Viruses.

(*See also* 3228j, 3492a, p, 4100.)

3379. THIEM, H.
Über virus- und virusverdächtige Erscheinungen im Obstbau. **(Virus and virus-suspected symptoms in fruit growing.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, p. 80.

Reference is made to specimens received by the author showing virus or virus-like symptoms in strawberry, raspberry, peach, plum, sweet cherries and apple, and also possible deficiency symptoms on apple and pear. Virus diseases of cherry and peach appear to be widespread in Germany and affected trees should be grubbed. The efforts made in other countries to raise healthy stocks of bush fruits suggest that similar methods should be studied in Germany.

3380. HEINZE, K.
Die Überträger pflanzlicher Viruskrankheiten. **(The vectors of plant virus diseases.)**
Mitt. biol. Zentralanst. Land- u. Forstw., Berlin-Dahlem, Hft **71**, 1951, pp. 127.

This index of plant virus vectors comprises two lists—one of vectors arranged in families, giving also the viruses they are reported to have transmitted, the feeding time required for transmission and references to the literature; the other giving virus diseases (with English common names) under their host plants, arranged in families, and their vectors. There are also full alphabetical indices in Latin, English and German to vectors and plants included in the lists. As this work seems to be unusually complete and up to date, it should prove a very useful reference book for those studying plant viruses and their vectors. A.F.P.

3381. RUI, D., CIFERRI, R., AND REFATTI, E.
La virosi degli "scopazzi del melo" nel Veronese. **(The virus disease apple broom in Verona.)**
Not. Mal. Piante, 1950, No. 13, pp. 7-11, bibl. 2.

RUI, D.
La virosi a scopazzi del melo.* **(Apple broom virus.)**
Humus, 1950, **6**: 11: 7-10, illus.

A virus disease of apple trees, particularly on the variety Welfort Park, causing "brooms" is described. The leaves on affected branches are smaller and narrower than usual and the principal veins are pale green. The disease has been transmitted to the Williams pear by grafting.

3382. YOUNG, H. C., Jr.
Indexing hosts for sour-cherry ring-spot and yellows.
Phytopathology, 1951, **41**: 479-80, bibl. 3.

The tests described confirm that *Prunus tomentosa* is an excellent host for detection of the necrotic ring-spot virus [*H.A.*, 20: 776b] but also indicate that the reaction of this species to inoculation with the cherry-yellows virus complex is not diagnostic.

3383. BLUMER, S., AND GEERING, J.
Das Kirschbaumsterben im Baselland (Pfeffingerkrankheit). **(The "Pfeffinger" disease in the canton of Basle.)** [English summary ½ p.]
Phytopath. Z., 1950, **16**: 300-35, bibl. 21, illus.

A disease of sweet cherries known as the "Pfeffingerkrankheit" in Basle canton, Switzerland, is graft-transmissible. It has been found on wild cherries also. The chief symptoms are restricted growth in spring, mosaic markings on the leaves, or leaves small and of irregular shape. There are fewer buds on diseased shoots than on healthy ones. Twigs and branches die back, and the disease also causes gummosis and reduced frost resistance. The symptoms may be masked by high manuring or by high summer temperatures. The possibility of control by selection of scions from healthy trees, by removal of diseased trees, by not using wild cherries for rootstocks, and by disinfection of pruning tools is discussed.

3384. KOTTE, W.
Die Schmalblättrigkeit der Süsskirsche (Pfeffingerkrankheit) auch in Deutschland. **(The "small leaf" or Pfeffinger disease of sweet cherries in Germany.)**
Phytopath. Z., 1951, **17**: 468-9, bibl. 2, illus.

The Pfeffinger disease caused by virus infection is here recorded for Germany.

3385. ANON.
New diseases attack fruit. Spread of "Henderson spot".
Fruit and Prod., 1951, **5**: 11: 7-8.

Two fruit diseases occurring in the Hawke's Bay district of New Zealand are the virus disease stony pit of pears, and a suspected virus disease, the Henderson spot or thumbmark of apples. The latter affects the fruit only, the apples having brown concentric markings similar to the whorls of a thumb. It has been found on the varieties Granny Smith and Delicious.

3386. SCARAMUZZI, G.
La "rosetta a foglie saliciformi" del pesco: una nuova malattia da virus. **(Rosette with willow shaped leaf; a new peach virus.)**
Humus, 1951, **7**: 13-18.

An account of a peach disease which has become much more serious in recent years in orchards of the Province of Savona. Elberta seems particularly susceptible but no variety appears to be immune. Flowering is delayed anything up to 15 days, and is then slow. Leafing may also be delayed by 15 to 20 days. Leaves in the affected parts form rosettes and are themselves of willow leaf shape. Fruit setting is scarce or nil. Fruits which do set are late and malformed. In many respects the condition resembles mosaic, in others peach wart, or again dwarf peach. It would appear to have originated only in the last 5 or 6 years and to be getting rapidly more serious.

* Abridged translation available.

3387. FITZPATRICK, R. E., AND MELLOR, F. C.
Studies of virus diseases of strawberries in British Columbia. 1. The reaction of the British Sovereign variety and the indicator *Fragaria vesca* to yellows.
Canad. J. Bot., 1951, **29**: 182-8, bibl. **20**, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa*, **1069.**

The results of the grafting experiments with British Sovereign leave little doubt that this variety is susceptible to the yellows disease, and can be expected to degenerate if the disease becomes established in the stock. The results of the experiment with *Fragaria vesca* show that this species is just as susceptible to the yellows of the Pacific Coast as Harris and King have shown it to be to the yellow-edge disease of Great Britain. The question of whether the two diseases, yellows and yellow-edge, are identical will be discussed in a subsequent paper of this series. [Authors' discussion.]

3388. FRAZIER, N. W.
New aphid vectors of strawberry viruses.
J. econ. Ent., 1951, **44**: 258-9, bibl. 4.

The common strawberry aphid, *Capitophorus fragaefolii*, a species probably identical with the English species *Pentatrichopus fragariae*, is the only insect, with the exception of the very closely related or synonymous species *Pentatrichopus tetrahodus*, which had hitherto been shown to transmit a virus of strawberry. In trials in California with 8 species of aphid other than the strawberry aphid, 5 were shown to transmit virus. Of the 5, *Myzaphis rosarum* and *Myzus porosus* were found only on cultivated rose, while *Amphorophora rubi*, *Macrosiphum pelargonii* and *Myzus ornatus* were collected on *Fragaria* spp. The viruses transmitted were all of the relatively non-persistent type and the symptoms produced on the indicator plants were largely of the crinkle variety.

3389. ANON.
Nova doença da videira, em Jundiaí. (**A new disease of vines in Jundiaí [Brazil].**)
Biológico, 1950, **16**: 204.

A disease of vines, which appears to be identical with Pierce's disease, was observed in the vine-growing district of Jundiaí, Brazil, for the first time in 1947, and is now spreading rapidly.

3390. FREZAL, P.
Note sur une dégénérescence infectieuse de la vigne des sables mostaganémois. (**An infectious degeneration of the vine on the Mostaganem sands.**)
Ann. Inst. agric. Algér., 1950, **5**: 5: 1-7, bibl. 2, illus.

An "infectious degeneration" of Carignon vines on sandy soil in the Mostaganem region of Algeria is characterized by short shoots, irregular leaves, and small fruit. The disease is transmissible by grafting and by cuttings.

Bacteria.

(*See also* 3492o.)

3391. NICOLINI, J. C.
La avispita costurera y la tuberculosis del olivo. (***Orasema aenea* Gahan and bacterial disease of olives.**)
Idia, 1950, **3**: 35/36: 20, bibl. 6, illus.

Bacterial disease of olives is caused by *Pseudomonas savastanoi* (E. Smith) Stevens, which enters the plant through surface wounds and is spread mainly by wind and rain. In the olive groves of Entre Ríos and Córdoba the author noticed wounds on the young leaves and developing fruits caused by a hymenopterous insect, identified as *Orasema aenea*, during oviposition. Tumours, found to be caused by *Pseudomonas savastanoi*, developed at these wounds. Artificial inoculations with the macerated insects produced similar tumours from which the bacteria were isolated. These preliminary experiments indicate that *Orasema aenea* is a carrier of *Pseudomonas savastanoi*. The biology of the insect has not been studied, but certain phases of its life history are known to be associated with the presence of ants.—Inst. San. veg., Argentina.

3392. REID, W. D.
Control of bacterial-spot of plum.
N.Z. J. Sci. Tech., Sect. A, 1950 (issued March 1951), **31**: 5: 40-3, bibl. 1.

Four applications of bordeaux mixture during the fruiting season reduced fruit infection [by *Xanthomonas pruni* (*H.A.*, 15: 1572)] from 38·9% to 6·8% in one season and from 19·6% to 5·5% in another.

3393. KATZNELSON, H., AND SUTTON, M. D.
Inhibition of plant pathogenic bacteria *in vitro* by antibiotics and quaternary ammonium compounds.
Canad. J. Bot., 1951, **29**: 270-8, bibl. 38, being *Contr. Bact. Dairy Res.* **314** (*J. Ser.*) and *Div. Bot. Plant Path., Sci. Serv. Dep. Agric., Ottawa*, **1084.**

The most potent agent for the inhibition of *Xanthomonas* spp. was aureomycin (0·1–0·05 p.p.m.), with terramycin and polymyxin next, while terramycin (0·2–0·1 p.p.m.) was the most effective compound against *Pseudomonas* spp., followed by streptomycin and aureomycin. For *Corynebacterium* spp. aureomycin (0·4–0·05 p.p.m.) was most effective, with neomycin and terramycin next. *Erwinia amylovora* was most sensitive to streptomycin and *E. carotovora* to polymyxin. The availability of most of these substances and their solubility in water offers great possibilities of treating internally infected seed by soaking, provided the compounds can be shown to have no phytotoxic action.

Fungi.

(*See also* 3492d.)

3394. RAMSFJELL, T., AND GJAERUM, H. B.
Forsøk med rådgjerder mot sjukdommer i frukt- og baerhagen 1949. (**Diseases of top and small fruit and their control in 1949.**) [English summary 1½ pp.]
Meld. Stat. Plantevern **4**, 1950, pp. 32, bibl. 12.

The natural infection period of apple rust (*Gymnosporangium tremelloides*), which is only of local importance in Norway, was found to coincide with the blossoming period (second half of May). Norwegian varieties were almost immune to the disease, while Ribston and Charles Ross proved very susceptible. Spraying with Fermate gave effective control. On two Swedish varieties apple blossom blight (*Sclerotinia*

laxa) was satisfactorily controlled by monocalcium-arsenite. Excellent results against apple canker (*Nectria galligena*) were obtained with the Dutch compound Kankerdood. Other fungus diseases discussed are apple scab, shot-hole of sour cherry, gooseberry mildew (*Sphaerotheca mors-uvae*) and leaf spot of black currant (*Drepanopeziza ribis*). Magnesium deficiency in top fruit, a common malady in Norwegian orchards, was remedied in a nursery by 4 magnesium sulphate (2%) foliage sprays, while soil applications failed to relieve leaf symptoms. Manganese deficiency in raspberry was cured by soil application of manganese sulphate and 3 foliage sprays (0·2%).

3395. Byrde, R. J. W., and Marsh, R. W.
Apple and pear scab spraying experiments at Long Ashton, 1949 and 1950.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 125-31, bibl. 6.

As regards control the summer of 1949 was too dry for comparison of results in the comparative absence of scab, but a 2% lime-sulphur pre-blossom spray followed by 2 post-blossom glyoxalidine sprays at 1 qt./100 gal. proved as phytotoxic to Cox—but not to Stirling—as standard lime-sulphur spraying. In the cool wet summer of 1950, 1 pre-blossom and 1 post-blossom treatment with glyoxalidine 341-C at 1 qt./100 gal. controlled scab on Cox as effectively as standard lime-sulphur treatment and was less phytotoxic. Glyoxalidine spraying was found to do much less damage than lime-sulphur to Lane's Prince Albert, Stirling Castle apple and Doyenné du Comice pear varieties. A phthalimide preparation (SR-406) showed promising apple scab control and absence of phytotoxicity.

3396. Andrén, F.
Besprutningsförsök mot äppleskorv. **(Spraying trials against apple scab.)**
Växtskyddsnotiser, 1950, No. 5-6, pp. 92-4.

In small-scale trials carried out in 1949 and 1950 bordeaux mixture gave the best protection. The merits of other compounds are discussed and data on their effectiveness are tabulated.

3397. Hinselmann, M.
Die Beobachtung des Sporenfluges als Grundlage einer erfolgreichen Fusicladium-bekämpfung im Jahre 1950. **(The observation of spore dispersal as a basis of successful scab control in 1950.)**
Mitt. ObstbVersuchsring Jork, 1951, **6**: 43-5.

Out of 2 spray programmes for apples, one gave 86·6–87·7% scab-free fruit, while the other, timed with great accuracy to give protection against the dispersing ascospores of *Venturia inaequalis*, resulted in 98·9% scab-free fruit.

3398. Loewel, E. L.
Der augenblickliche Stand der Mittelfrage in der Fusikladiumbekämpfung. **(The present position regarding anti-apple scab preparations.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 40-2.

This article includes notes on the use against scab of mercury and copper compounds, proprietary organic preparations (Fuclasin, Nirit), wettable sulphur, the addition of arsenates to the post-blossom sprays, and the addition of summer oil to fungicides. Favourable results were obtained by replacing bordeaux mixture with a mercury preparation for the pre-blossom spraying.

3399. Refatti, E., and Borzini, G.
Prove di laboratorio e di campagna circa l'attività di un anticrittogamico a base di gliossalidine ("Crag 341 C") e uno trimetallico ("Crag 658"). **(Trials in the laboratory and in the field of a fungicidal glyoxalidine derivative ("Crag 341 C") and a trimetallic complex "Crag 658").)** [English summary ½ p.]
Not. Mal. Piante, 1950, No. 13, pp. 42-55, bibl. 11.

In field trials against apple scab on Canada Reinette the glyoxalidine derivative, at 0·1–0·2%, gave control of the leaf infection equal to that of standard lime-sulphur and better results against fruit infection. In field tests against vine downy mildew the trimetallic fungicide, at 0·3%, was slightly inferior to Caffaro powder at 1%. No phytotoxic effects on apple or vine were observed.

3400. Luchetti, G., and Maccanti, M.
Osservazioni e relievi sulla biologia della *Venturia inaequalis* (Cooke) Aderh. e sui sistemi di lotta contro la "ticchiolatura" del melo nel Ferrarese. **(Observations and remarks on the biology of *Venturia inaequalis* (Cooke) Aderh., and methods of controlling apple scab in Ferrara.)**
Not. Mal. Piante, 1950, No. 13, pp. 14-31, bibl. 45.

Previous work on apple scab is reviewed and observations on the spring development of the scab fungus are described. It is concluded that in the province of Ferrara there is no relation between the development of the fungus and the biologic cycle of the apple, and that pre-blossom applications of fungicides against ascospore infection are unnecessary.

3401. Groves, A. B.
An apparent influence of naphthalene acetic acid applications on subsequent fruit abscission and black-rot development.
Abstr. in *Phytopathology*, 1951, **41**: 561.

The obvious source of inoculum, in a serious outbreak of black rot (*Physalospora obtusa*) on the apple variety Rome in 1950, were infected small fruits which remained attached after the trees had received applications of naphthaleneacetic acid in 1949. Blocks receiving no such applications in 1949 were free from both abnormally adherent fruits and the associated black rot.

3402. Ramsey, G. B., Smith, M. A., and Heiberg, B. C.
Anthracnose of peaches.
Phytopathology, 1951, **41**: 447-55, bibl. 8, illus.

Transport tests indicate that there is a risk of serious development of anthracnose (*Glomerella cingulata*) in peaches through wounds made during harvesting and packing and by contamination with spores in seasons

when there is an abundance of inoculum in the orchards. —U.S. Dep. Agric.

3403. Müller, E.
Die Weissfleckenkrankheit der Birnbäume. (Leaf fleck on pears.)
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 163-6, bibl. 2, illus.
The primary infection of this disease originates from the ascospore stage of the causal fungus *Mycosphaerella sentina*. Its summer form is also called *Septoria piricola*. It occurs usually after the middle of the summer, is not considered a serious disease in Switzerland and is normally kept in check through scab control.

3404. Hoffmann, P.
Peronosporabekämpfung mit Ob 21. (Peronospora control with Ob 21.)
Höfchen Briefe, 1951, **4**: 110-17, illus.
The copper preparation Ob 21 at 0·5% spray concentration applied at the rate of 0·3 l. per vine the first, 0·5 l. the second and 0·6 l. the third treatment was about equal to copper sulphate and significantly better than copper dust for the control of downy mildew on vines.

3405. Mazzei Patrone, I.
Tratamientos sanitarios en viticultura. (Disease control in viticulture.)
Publ. Minist. Agric. Lab. Fisiol. Patol. veg. Uruguay **101**, 1950, pp. 16.
This is an account of the control of vine downy mildew (*Plasmopara viticola*), anthracnose (*Gloeosporium ampelophagum* = *Sphaceloma ampelinum*) and powdery mildew (*Uncinula necator*), the preparation of the necessary fungicides, and the treatment at different seasons.

3406. Leontjeva, Ju. A.
The control of white rot of vines. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 4, pp. 43-4.
For the control of white rot of grapes (*Coniothyrium diplodiella*), spraying with an organic sulphur preparation No. 2 (15% tetramethyl-thiuramdisulphide), is recommended, the first application being made after blossoming, the second when the first signs of infection appear.

Nematodes.

3407. Chitwood, G. B., Specht, A. W., and Havis, A. L.
Reactions of peach seedlings to nematode infections.
Abstr. in *Phytopathology*, 1951, **41**: 559.
Seedlings of peach rootstock varieties were inoculated with the root-knot nematode *Meloidogyne javanica* and with *M. incognita* and their reactions recorded. One seedling, S-37, was resistant to both species.

Mite and insect pests.

(*See also* 3492h, k, n, r, s, v, z, 3493a, 3919.)

3408. Huffaker, C. B., and Spitzer, C. H., Jr.
Some factors affecting red mite populations on pears in California.
J. econ. Ent., 1950, **43**: 819-31, bibl. 10.
Investigations at the University of California, Albany, showed that wind influenced the rapidity of development of two-spotted mites, *Tetranychus bimaculatus*, on pears. Mass distribution of eggs of *Chrysopa californica* reduced populations of European red mites, *Paratetranychus pilosus*, but failed to prevent economic loss. Field and greenhouse trials did not confirm the theory that the destruction of natural enemies was primarily responsible for the recent increase in red mite populations. While results might be indicative of a physiological stimulus to reproduction by DDT spray, it is considered more likely that the toxicity of the oil " spreader " used in the lead arsenate spray, replaced by DDT, previously gave some measure of control. The population data obtained from the trees were consistent with the view that, other factors being favourable, DDT applications are inherently conducive to an earlier and more severe development of the European red mite on Bartlett pears in the area, and suggest a very delicate balance, possibly interrelated with DDT applications, between the mite and the physiology of its host.

3409. Rosenstiel, R. G.
Reactions of two-spotted mite and predator populations to acaricides.
J. econ. Ent., 1950, **43**: 949-50, being *Tech. Pap. Ore. agric. Exp. Stat.* **647.**
The use of several acaricides reduced initial infestation of raspberries in Oregon by the two-spotted mite, but this was offset by subsequent re-infestation due to the destruction of natural predators by the acaricides.

3410. van Dinther, J. B. M.
***Eriophyes gracilis* Nal., als verwekker van gele bladvlekken op framboos. (*Eriophyes gracilis* as a cause of yellow leaf spots on raspberry.)** (English summary 2½ pp.]
Tijdschr. PlZiekt., 1951, **57**: 81-94, bibl. 4, illus.
The raspberry mite, *Eriophyes gracilis*, is one cause of yellow leaf spots of raspberry. Details are given of its biology and of the symptoms it produces. With heavy mite infestation, large yellow areas appear on the upper sides of the leaves and light green spots on the under sides. During hibernation the mites penetrate between the outer bud scales but do not reach the inner ones or the well-protected young leaf tissues and inflorescences. Mite injury to raspberries is rarely serious enough to affect the growth of the plants, so that control measures are not usually necessary.

3411. McAlpin, D. M.
Bryobia mite on apples and pears.
J. Dep. Agric. Vict., 1951, **49**: 80.
The best spray for a heavy summer attack of bryobia mite is an organic phosphate compound which, in addition to controlling the mites, also kills the larvae of codling moth and the light brown apple moth. Suitable organic phosphates are E.605, Folidol, parathion, Phosphone, and Paraphos. They should be applied at a strength of at least 0·01% of the active constituent, which is usually 33% stronger than the manufacturer's recommendation.

3412. DE FIGUEIREDO, E. R., Jr.
A aranha vermelha da macieira. **(Apple tree red spider.)**
Biológico, 1950, **16**: 228-30, bibl. 3, illus.
In a general account of the occurrence and habits of *Bryobia praetiosa* in Brazil, it is mentioned that Rhodiatox (diethylparanitrophenyl thiophosphate), at a concentration of 1: 5,000, controlled the insect and killed the eggs.

3413. FICCO, D.
Il *Paratetranychus ununguis* parassita del melo. **(*Paratetranychus ununguis* as a pest of apple.)** [English summary 2 lines.]
Not. Mal. Piante, 1951, No. 14, p. 19, bibl. 1.
This acarid was found causing injury to young shoots and leaves of the apple variety Stayman Winesap near Pavia, in April 1950.

3414. HAHMANN, K., AND MÜLLER, H. W. K.
Zum Auftreten und zur Bekämpfung der Erdbeermilbe. **(The occurrence and control of the strawberry mite.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1951, **3**: 33-7, bibl. 11, illus.
Severe infestation by the strawberry or cyclamen mite (*Tarsonemus pallidus*) in the strawberry growing district of Vierlanden near Hamburg is described. Two to three spray applications of a BHC preparation, Hexacid G, at 0·2% at 3-day intervals after harvest gave satisfactory control, as did E.605 forte at 0·03% and 0·05%. An additional treatment in the early spring is, however, thought advisable. For the control of mites on young planting material immersion in E.605 forte is recommended [see also abstract below].

3415. ROESLER, R.
Zur Bekämpfung der Erdbeermilbe (*Tarsonemus pallidus* Banks). **(Control of the strawberry mite.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1951, **3**: 37.
In September 1950 rooted runners of the strawberry variety Madame Moutôt were dipped into solutions of 1% Gesapon, 0·2% Gamma-Nexen and 0·03% and 0·05% E.605 forte before being transplanted. Good control of the mites was obtained by all treatments, 0·05% E.605 forte being the most effective. The chemicals were applied again as sprays 14 days later, and it was thought necessary to repeat the treatment before oviposition the following spring.

3416. STELLWAAG, F.
Die Milbenkräuselkrankheit der Rebe und ihre Bekämpfung. **(Mite damage to vines and its control.)**
Flugbl. biol. Bundesanst. Braunschweig, **L13**, 1951, pp. 7, illus.
The nature of damage caused by the mites *Phyllocoptes vitis*, *Epitrimerus vitis* and *P. viticulus* is described in some detail. Six sprays are mentioned as efficacious in the dormant season and seven for use when the symptoms appear as the plant is coming into leaf.

3417. FRANKLIN, H. J.
Cranberry insects in Massachusetts.
Bull. Mass. agric. Exp. Stat. **445**, Parts II-VII, 1950, pp. 87.
The first part of this bulletin which dealt with all wormlike pests of the cranberry was published in 1948 [*H.A.*, 19: 1968]. Here all the rest of the known pests in Massachusetts are dealt with at some length and with clear illustrations. Beneficial insects have a chapter to themselves, as also pest control measures. The cheapest of all controls for many pests is flooding. Notes are given on the use of lead arsenate, cryolite, sodium cyanide, pyrethrum, rotenone, ryania, DDT and nicotine sulphate, especially methods of application.

3418. ARMSTRONG, W. D.
Recent strawberry insect work in Kentucky.
Down to Earth, 1950, **6**: 2: 6-7, bibl. 1, illus.
The pests considered were strawberry weevil, tarnished plant bug and crown borer, and the chemicals used for their control DDT, BHC, toxaphene, chlordane and parathion.

3419. ŠAPOŠNIKOV, G. H.
The migration of the apple gall aphid. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **72**: 1183-5, bibl. 9.
The evidence for and against the migration of the apple gall aphid (or red-leaf apple aphid), *Yezabura devecta* (=*dentatus* or *Anuraphis communis*) is discussed, and an experiment is described in which it was successfully transferred to *Anthricus nemorosa*. It is suggested that its migration depends upon the climate of the region where it is to be found. Control measures should thus be based on its habits. In the south of U.S.S.R., where its migration is general, the destruction of the alternate umbelliferous host plants is recommended; in the north reliance must be on grease-banding.

3420. EHRENHARDT, H.
Die Apfelblutlaus und ihre Bekämpfung. **(Woolly aphis and its control.)**
Flugbl. biol. Bundesanst. Braunschweig **K14**, 1951, pp. 8, illus.
The woolly apple aphid is described, with recommendations for its control and lists showing varieties classed as very susceptible, moderately susceptible, not or only slightly susceptible, and doubtful.

3421. KEARNS, H. G. H., AND MORGAN, N. G.
A note on the control of leaf curling plum aphid by a DDT emulsion.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 123-4.
A DDT benzol emulsion, 0·5% DDT, 0·2% benzol and 0·25% Shellestol wetter, completely controlled the leaf curling plum aphid (*Brachycaudus helichryzi*) when used at bud burst and failed to control it when applied after the flowering stage.

3422. SERVICE DE LA DÉFENSE DES VÉGÉTAUX.
Protection des plants contre le capnode noir dans les pépinières. **(The control of the black capnodis in nurseries.)**
Terre maroc., 1951, **25**: 14-15.
Advice is given on the control of capnodis [*Capnodis tenebrionis*] in nurseries by cultivation methods, namely the use of clean ground at a distance from infested plantations and planting material only from uncontaminated sites, collecting the adults and the application

of insecticides. For spraying 0·4–0·5% HCH is recommended, applied copiously to the base of the stem and to the soil around to a distance of 15 cm., for dusting a 10% preparation. [See also *H.A.*, 20: 261, 262.]

3423. Woodside, A. M.
Cat-facing and dimpling of peaches.
Bull. Va agric. Exp. Stat. **435,** 1950, pp. 18, bibl. 10, illus.

The insects causing cat-facing and dimpling of peaches are the plum curculio (*Conotrachelus nenuphar*), tarnished plant bug (*Lygus oblineatus*), euschistus stink bugs, the most common being the brown stink bug, *Euschistus servus*, and the dusky stink bug, *E. tristigmus*. The green stink bug, *Acrosternum hilare*, causes dimpling. A 4-year trial of insecticides has shown that cat-facing can be materially reduced by spraying. The most effective materials have been parathion at 1 lb. of 25% wettable powder per 100 gal., DDT at 2 lb. of 50% wettable powder, and chlordane at 2·5 lb. of 40% wettable powder. Each material gave the best result when applied at full bloom or petal fall. One spray gave good commercial control.

3424. Asquith, D.
Concentrated sprays to control plum curculio on peach.
J. econ. Ent., 1950, **43**: 843-5, bibl. 1, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1626.**

Trials in Pennsylvania indicated that parathion and dieldrin at four times standard spray concentrations were effective against plum curculio [*Conotrachelus nenuphar*], applied as mists at ¼ to ⅛ the standard quantities, and that dieldrin residue was the more persistent. It is suggested that plum curculio on peach can be controlled by dieldrin with fewer sprays in areas where infestation begins early and there is no risk of fruit carrying a residue at harvest.

3425. Mundinger, F. G.
The apple flea weevil.
J. econ. Ent., 1951, **44**: 28-33, bibl. 3, illus., being *J. Pap. N.Y. St. agric. Exp. Stat.* **844.**

DDT used at a concentration of 1 lb. actual DDT in 100 gal. of spray was the most effective material tested in New York for the control of the apple flea weevil, *Rhynchaenus pallicornis*. It gave considerable protection from beetle injury, even when the concentration was reduced to 0·5 lb. Fluorine compositions, chiefly cryolite, were nearly equally effective. In preliminary trials both parathion and BHC proved very effective against the insect. Pyrethrum and rotenone dusts were found to be toxic to the insects, but their practical use remains to be demonstrated. The pest is most effectively controlled by sprays applied in early spring against the overwintering beetles; summer treatments merely reduce the weevil population for the coming year. The experiments have shown that two treatments were more effective than one, although in seasons of rapid blossom bud development one spray may prove sufficient. [From author's summary.]

3426. Cutright, C. R.
New insecticides for summer control of apple flea weevil.
J. econ. Ent., 1950, **43**: 947, bibl. 3.

In a heavily infested orchard in Ohio sprays of EPN 300, parathion, methoxychlor, DDT and cryolite were effective against *Orchestes pallicornis*.

3427. Langford, G. S., Squires, D. W., and Dozier, B. H.
The relative efficiency of some insecticides for Japanese beetle control.
J. econ. Ent., 1951, **44**: 197-201, bibl. 5.

Both field and laboratory tests indicated that DDT, BHC, lindane, parathion, aldrin, chlordane, methoxychlor, TDE, dieldrin and toxaphene were effective, either as emulsions or wettable powders, for killing Japanese beetles and as a protectant. [From authors' summary.]

3428. Hoffmann, A.
L'agrile des arbres fruitiers (*Agrilus sinuatus* Ol.). **(The sinuate pear tree borer.)**
[*Rapp.*] *Congrès pomologique de France, 12 au 15 Octobre 1950*, Paris, 1950, pp. 161-9, bibl. 19, illus.

The sinuate pear tree borer is a common pest of pear, apple, medlar and quince in the south of France, and since the war it has been increasing rapidly. An account of its habits and life cycle is followed by a review of modern methods of control. In trials carried out by the author in the Versailles district, the following mixture applied to the trunk and branches during the flight period of the adults had a repellent effect: 600 g. 8% HCH dust, 2 kg. white summer oil, 100 l. water. It had no larvicidal effect. The young larvae were killed, however, by 150-300 g. 12% HCH in 100 l. water applied during the 3rd week in July, and there were indications that the highest concentration was also ovicidal.

3429. Dean, R. W.
Evaluation of some new insecticides for apple maggot control.
J. econ. Ent., 1951, **44**: 147-53, bibl. 1, being *J. Pap. N.Y. St. agric. Exp. Stat.* **848.**

In laboratory trials, parathion, dieldrin and heptachlor were the most outstanding of the 19 chemicals used to control apple maggot, *Rhagoletis pomonella*. Toxaphene, aldrin, EPN, CS-645A+CS-674A and Q-137 were also very toxic but slower in action. In the field, however, no satisfactory control was obtained owing to lack of residual toxicity.

3430. Thiem, H.
Über Erfahrungen zur Bekämpfung der Kirschfruchtfliege. **(Trials for the control of the cherry fruit fly.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 118-21.

Results of experiments are tabulated to show the degree of control of the cherry fruit fly [*Rhagoletis cingulata*] obtained by applications of Gesarol, E.605 f, and DDT.

3431. Thiem, H.
Wie ernte ich madenfreie Kirschen? **(Cherry fruit fly control.)**
Flugbl. biol. Bundesanst. Braunschweig, **K13,** 1951, pp. 8, illus.

The cherry fruit fly (*Rhagoletis cerasi*) and its life history are described with notes on its control by indirect measures and by the application of Gesarol 50, DDT dust, and E.605.

3432. Tchouvakhine, P. V.
Typhlocyba rosae **L.**
Ent. Phytopath. appl. Tehran, 1949, No. 9, pp. 9-10, illus.
This leaf hopper has been collected by the author in Iran on fruit trees, particularly apple, pear, cherry and plum, and on rose, and plane trees. It can be controlled by preparations containing nicotine or anabasin sulphates, and 10% Gesarol has also given good results.

3433. Richardson, C. H., and Du Chanois, F. R.
Codling moth infestation in the tops of sprayed and of unsprayed apple trees: Second report.
J. econ. Ent., 1950, **43**: 912-14, bibl. 1, being *J. Pap. Ia agric. Exp. Stat.* **j-1843.**
Experiments carried out in central Iowa have shown that codling moth favours the upper parts of sprayed as well as unsprayed apple trees for oviposition. [See also *H.A.*, 21: 1502.]

3434. Driggers, B. F.
Parathion toxic to codling moth larvae after they enter the fruit.
J. econ. Ent., 1950, **43**: 948-9, bibl. 2.
Data are presented showing a complete kill of codling moth larvae inside apples by 1 lb. of either 15% or 25% parathion wettable powders in 100 gal. water.

3435. Tomlinson, W. E., Jr.
Control of insect larvae infesting immature blueberry fruit.
J. econ. Ent., 1951, **44**: 247-50, bibl. 3.
The larvae of the cranberry fruitworm, *Mineola vaccinii*, cherry fruitworm, *Grapholitha packardi* and plum curculio, *Conotrachelus nenuphar*, cause serious loss to cultivated blueberries, both in the field and in packed fruit in New Jersey. Methoxychlor, both alone and in combination with lead arsenate, applied at the rate of about 200 gal. per acre was found comparatively safe and effective against all three insects.

3436. Chiarelli de Gahan, A., and Tourón, E. A.
Datos biológicos de *Proxenus rionegrensis* (i.l.). **(Biological data on *Proxenus rionegrensis*.)**
Rev. Invest. agríc. B. Aires, 1950, **4**: 139-51, bibl. 7, illus.
Hibernating larvae of *Proxenus rionegrensis* were discovered in 1945 on apple trees in the Rio Negro Valley, and specimens reared in the laboratory showed a decided preference for apple leaves. Since then the larvae have been reported in considerable quantity feeding on apple trees and skeletonizing the leaves. The insect is described in its various phases of development and biological data are presented.

3437. Rusiašvili, I. L.
Control of night-flying moths in Kahetii. [Russian.]
Vinodelie i Vinogradarstvo, 1951, No. 2, pp. 39-40, illus.
The damage caused in Georgia (U.S.S.R.) by the larvae of night-flying moths [see also *H.A.*, 19: 1074] to vines is described. Best control was obtained by applications of Paris green; trapping by treacle is also mentioned.

3438. Dever, D. A., and Fluke, C. L.
New insect pest of cherries.
Wis. Hort., 1951, **41***: 137-8, illus.
The cherry fruit worm, *Grapholitha packardi*, was first observed in Door County, Wisconsin, in 1949, and constituted a serious threat to the industry. Spraying with methoxychlor at the rate of 2 lb. per 100 gal. about 4 weeks after petal fall, however, was found to provide adequate control. The life history of the insect and the damage caused by it are described.

3439. Beckham, C. M., Hough, W. S., and Hill, C. H.
The biology and control of the spotted tentiform leaf miner on apple trees.
Tech. Bull. Va agric. Exp. Stat. **114,** 1950, pp. 19, bibl. 7, illus.
An account of the spotted tentiform leaf miner (*Lithocolletis crataegella* Clem.) is given under: distribution and host plants, appearance and habits, life history, natural enemies, and control. Nicotine sulphate, DDT and parathion all proved toxic at certain stages. A single application of nicotine sulphate (Black Leaf-40) at the rate of either ½ pint or 1 pint in 100 gal. water applied in the first cover spray (about 8 to 19 days after the petal-fall stage) controlled the insect throughout the season. Fixed nicotine (Black Leaf-155) at 3 lb. in 100 gal. water was also effective.

3440. Jancke, O.
Honigbienen als Fruchtschädiger. **(Fruit damage by bees.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1951, **3**: 56-7, illus.
A note on bees causing primary injury to ripe peaches.

3441. van den Bruel, W. E., and Bernard, J.
Note sur la nuisance de *Hoplocampa minuta* Christ. et de *Hoplocampa flava* L. en Belgique en 1949. **(Note on the damage caused by *Hoplocampa minuta* and *H. flava* in Belgium in 1949.)**
Parasitica, 1951, **7**: 16-27, bibl. 3, illus.
The distribution of these two plum sawflies in Europe is reviewed and a more detailed account given of their distribution in Belgium as determined by a survey in the various plum-growing areas.

3442. Thiem, H.
Abwehr der Fruchtschäden von Sägewespen bei Pflaume, Apfel und Birne. **(The prevention of fruit damage by sawflies to plum, apple and pear.)**
Flugbl. biol. Bundesanst. Braunschweig, **K8,** 1951, pp. 8, illus.
A description is given of the sawflies attacking plum, apple and pear, the damage caused and their control by quassia, organic phosphorus, and hexa preparations.

3443. Autuori, M.
" M.M.33 ", um novo formicida a base de brometo de metila no combate à formiga saúva (*Atta* spp.). **(M.M.33, a new formicide containing methyl bromide for control of leafcutting ants (*Atta* spp.).)**
Biológico, 1950, **16**: 175-80, bibl. in text.

* Given as Vol. 42 in error.

M.M.33 is a solution of methyl bromide in benzol and carbon bisulphide with 10% trichlorobenzol. In trials in São Paulo this preparation completely destroyed the nests of leafcutting ants in eucalyptus groves within 30 days and was found very simple to use.

3444. Cutright, C. R.
Comstock mealybug in Ohio.
J. econ. Ent., 1951, **44**: 123-4.
An account is given of the biological control of the Comstock mealybug [*Pseudococcus comstocki*] on apple, principally through the use of the parasites *Allotropa*, *Clausenia* and *Pseudophycus* spp.

3445. Šutova, N. N.
The comstock mealy bug control problem is solved by a biological method. [Russian.]
Sad i Ogorod, 1951, No. 1, pp. 32-4, illus.
The comstock mealy bug (*Pseudococcus comstocki*) is a serious pest of fruit trees and the mulberry in Uzbekistan. A parasitic insect, referred to as " pseudaficus ", is being studied at the Uzbekistan quarantine laboratory and its release in plantations has resulted in very satisfactory control of the scale. The habits of the parasite are described.

3446. Garcia, R. C.
Contribuição para o estudo da sistemática morfologia, biologia e ecologia de cochonilha amarela. **(A study of the systematic morphology, biology and ecology of the red scale insect.)** [Summaries in English and French ½ p. each.]
Bol. Junta nac. Frut. Lisbon, 1949, **9**: 374-465, bibl. 40, illus.
A detailed description of *Chrysomphalus dictyospermi* Morg. with a list of its 120 host plants, which include citrus, vines, olives and many ornamentals.

Other pests.

3447. Eadie, W. R.
New techniques in control of orchard mice.
Bull. Cornell agric. Exp. Stat. **856**, 1950, pp. 16, bibl. 6, illus.
It is concluded that the formula 1 gal. denatured ethyl alcohol (undiluted commercial grade), 7 lb. powdered rosin, and ½ oz. 1080 (sodium fluoroacetate) is of value as a fruit tree coating against above-ground damage by mice.

3448. Reiff, M., and Wiesmann, R.
Untersuchungen über ein neues Rodentizid mit kumulativer Wirkung auf Basis der Cumarin-Derivate. **(Investigations on a new poison for rodents, having a cumulative effect, based on coumarin derivatives.)** [English and French summaries 1 p. each.]
Acta trop., 1951, **8**: 97-130, bibl. 41, illus.
An account is given of observations on the effects of coumarin derivative G 23 133, the active substance of which is 3-(*a*-p-chlorophenyl-β-acetylethyl)-4-hydroxycoumarin. The test methods are recorded and the results obtained discussed. There would appear to be no danger to persons using the poison, and the dangers inherent for domestic animals can be made negligible by care.

3449. Price, M. D.
Advances in rodent control.
Food, 1951, **20**: 210-14, bibl. 4.
The results obtained in the trials outlined show that anti-coagulants such as dicoumarin (and, more recently, 3: 4 coumarol or warfarin) provide a new and effective means of exterminating rats and mice.

Antibiotics and biological control.

(*See also* 3393, 3492f, 3946.)

3450. Grossbard, E.
Antibiotics and microbial antagonism in plant pathology.
Endeavour, 1951, **10**: 145-50, bibl. 17.
The possibility of controlling plant diseases by the use of antibiotics themselves or indirectly by stimulating, through appropriate manuring, the growth of micro-organisms naturally present in the soil to produce antibiotics is here considered. Examples of potentially useful substances are given and among them griseofulvin, which is derived from soil Penicillia and has the properties of a systemic fungicide. Another promising antibiotic is antimycin isolated in the U.S.A. and tested widely in greenhouse trials. Similarly against the grey mould of lettuces it has been found possible to colonize tissues of lettuce with organisms antagonistic to *Botrytis cinerea* and so reduce subsequent infection. Suitable manuring can produce conditions in the soil favourable to successful microbial action against plant pathogens, such as *Phymatotrichum omnivorum*, and *Ophiobolus graminis*. Sometimes the desired action of antagonistic organisms can be obtained by bulk inoculation of the soil, but in general appropriate manuring is also necessary.

3451. Abraham, E. P., and Newton, G. G.
Antibiotics.
A.R. Progr. Chem., 1951, **47**: 285-303, bibl. 188.
A review of the recent literature on antibiotics derived from fungi, actinomycetes and bacteria and on some other aspects of this new field of research.

3452. Brian, P. W.
Antibiotics produced by fungi.
Bot. Rev., 1951, **17**: 357-430, bibl. 276.
In the first section of this very thorough review of the literature, records of antibiotic production in each of the taxonomic groups of fungi are considered in turn. In the second section, short characterizations of the isolated antibiotics are given, based on their physical, chemical and biological properties.

3453. Peck, R. L., and Lyons, J. E.
Biochemistry of antibiotics.
Annu. Rev. Biochem., 1951, **20**: 367-414, bibl. 276.
This review covers the period from approximately December 1949 to December 1950.

3454. Bishop, C. J., and MacDonald, R. E.
A survey of higher plants for antibacterial substances.
Canad. J. Bot., 1951, **29**: 260-9, bibl. 19.
Of 209 Nova Scotian plants surveyed, 33·4% were found to contain one or more antibacterial substances. All the plants tested are listed and some tabulated data

are presented of those whose extracts showed any activity. The 10 most active plants were found to be *Cirsium arvense*, *Chimaphila umbellata*, *Eupatorium perfoliatum*, *Menyanthes trifoliata*, *Monotropa uniflora*, *Myrica gale*, *Nymphaea odorata*, *Oxalis europaea*, *Populus gileadensis*, and *Pyrus malus*.

3455. Cercos, A. P.
Antagonismo y antibiosis en relación con los patógenos vegetales. **(Antagonism and antibiosis in relation to plant pathogens.)**
Idia, 1950, **3**: 35/36: 13-19, bibl. 55, illus.
A review of the literature on the effect of soil micro-organisms on pathogens of crop plants.

3456. Gottlieb, D., and others.
Endomycin, a new antibiotic.
Phytopathology, 1951, **41**: 393-400, bibl. 18.
A new antibiotic, named endomycin, has been isolated from cultures of an unidentified species of *Streptomyces*. It inhibits the growth of a wide variety of fungi pathogenic to plants and animals including the brown rot fungus *Sclerotinia fructicola* and the bitter rot fungus *Glomerella cingulata*.—Univ. of Illinois.

3457. Klöpping, H. L., and van der Kerk, G. J. M.
Antifungal agents from the bark of *Populus candicans*.
Nature, 1951, **167**: 996-7, bibl. 6.
A bark extract completely inhibited the growth of *Botrytis cinerea*, *Penicillium italicum*, *Aspergillus niger* and *Rhizopus nigricans*.—Inst. for Organic Chemistry T.N.O., Utrecht, Holland.

3458. Davydov, P. N.
A bacterial method for controlling gooseberry mildew. [Russian.]
Sad i Ogorod, 1951, No. 6, pp. 34-6.
The author claims to have controlled mildew (*Sphaerotheca*) on gooseberries by spraying with an infusion of cowdung, which caused the mildew to disappear completely, whereas spraying with fungicides only checked it. The result is attributed [without experimental evidence] to the action of bacteria on the fungus mycelium.

3459. Scognamiglio, A.
L'istituzione in Portici del Centro Nazionale di Lotta Biologica. **(The establishment at Portici of the National Institute for Biological Control.)**
Humus, 1951, **7**: 1: 23.
G. Russo, Silvestri's successor to the chair of entomology, is the director. Most of his work will be directed primarily to the control of the numerous insect pests of fruit and vegetable plants.

3460. Clausen, C. P.
The time factor in biological control.
J. econ. Ent., 1951, **44**: 1-9, bibl. 17.
The author in his presidential address to the 62nd annual meeting of the American Association of Economic Entomologists, after outlining the history of biological control of certain pests of citrus, plum, apple, sugar cane, coconut, coffee and cabbage, concludes: (1) a fully effective predator or parasite is always easily and quickly established; (2) failure to establish a parasite or predator easily and quickly indicates it will not be fully effective; (3) colonization of an imported parasite or predator may be discontinued, if no evidence of establishment is forthcoming after 3 years.

3461. Tunblad, B.
Parasiter på parasiter. **(Predators of fruit pests.)**
Sver. pomol. Fören. Årsskr., 1950, **51**: 193-9, illus.
The significance of biological control of Swedish fruit pests and the threat to beneficial insects by the new insecticides are discussed. Drawings show predators at work.

3462. Michelbacher, A. E., Middlekauff, W. W., and Hanson, C.
Occurrence of a fungus disease in overwintering stages of the codling moth.
J. econ. Ent., 1950, **43**: 955, bibl. 1, illus.
A fungus, probably *Beauveria bassiana*, was found to exert important biological control of codling moth in a walnut orchard in California under certain conditions.

Soil treatment.

(*See also* 3492x.)

3463. Taylor, R. H.
Soil sterilization, various methods described.
J. Dep. Agric. Vict., 1951, **49**: 223-8, 231, illus.
Soil sterilization prior to raising seedlings is described in relation to the following: (1) diseases which can be controlled by soil sterilization (damping-off, wilt diseases, and nematodes), (2) methods available for soil sterilization (heat treatment—the pit method and the " rake " system), (3) precautions necessary for heat sterilization, (4) chemical methods (formalin, Cheshunt compound, soil injection with soil fumigants). Reference is made to the sterilization of ground used for raising cherry stocks from seed by injecting the soil with chloropicrin. A soil injector for use with soil fumigants is illustrated.

Fungicides.

(*See also* 3492c, t.)

3464. Marsh, R. W.
Some recent developments in the field of agricultural fungicides.
J. Sci. Food Agric., 1951, **2**: 241-4, bibl. 8.
A review of the field performance of some of the newer agricultural fungicides relating not only to disease control but also to economic factors and phytotoxic effects. Work carried out and practices adopted in Britain are compared with those in North America, and are considered under the following headings: Synthetic organic fungicides, with sub-headings: foliage protectants, seed and seedling treatments, fungicidal soil-fumigants; anti-biotics; methods of application; systemic fungicides.

3465. Neergaard, P.
Retningslinierne ved afprøvning af fungicider. **(The testing of fungicides.)** [English summary 11 lines.]
Reprinted from *Nord. Jordbruksforsk.*, 1949/50, No. 3-4, pp. 212-32, bibl. 24 [received 1951].

Methods of testing fungicides are discussed, as applied to (1) seed disinfection and seed protection, (2) spraying and (3) dusting of crops. The more important modern bioassay methods are also dealt with, largely from the author's own experience. The routine testing of fungicides in Denmark is described and suggestions are made for closer inter-Scandinavian co-operation.

3466. KOVACHE, A., AND OTHERS.
Recherches sur les propriétés fongicides de certains composés organiques. **(Testing the fungicidal properties of certain organic compounds.)**
Ann. Épiphyt., 1947, **13**: 67-81 [received 1951].

Thirty-eight synthetic organic compounds were tested in the greenhouse for use against vine mildew (*Plasmopara viticola*). Seven of them, sprayed at 0·05%, prevented development of the parasite without any phytocidal action.

3467. SCHMITT, C. G.
Comparison of a series of derivatives of 4,5-dimethyl-2-mercaptothiazole for fungicidal efficacy.
Contr. Boyce Thompson Inst., 1951, **16**: 261-5, bibl. 12.

A test was made of the toxicity of 20 derivatives of 4,5-dimethyl-2-mercaptothiazole to the fungi *Fusarium lycopersici*, *Sclerotinia fructicola*, *Polyporus tulipiferus*, *Phytophthora cinnamoni* and *Trichophyton rosaceum* which were supplied to the fungicides as mycelium or spores grown on potato dextrose agar. The benzoyl, n-butyl and acetonyl derivatives were most toxic to fungi. The lead, zinc and magnesium salts were most effective in a cotton fabric preservation test.

C.W.S.H.

Combined sprays.

3468. ANON.
New safer-to-use spray coming soon.
Fruitgrower, 1951, No. 2895, pp. 1107.

An introductory note on trials with Midox, a combined insecticidal/fungicidal spray originating from Denmark, claiming to obviate the necessity for winter washes.

Insecticides.

(*See also* 3250, 3492b, l, q, t, u, 3831n.)

3469. TEW, R. P.
Pest control in Germany during the period 1939-1945.
Rep. B.I.O.S. Surveys* **32**, 1951, pp. 112, bibl. numerous. H.M. Stationery Office, 3s.

This is an account of the preparation and properties of the pest control materials in common use in Germany during the war and of research directed towards the development of new and substitute agents. The preparations are described under: insecticides and acaricides (organic compounds, inorganic compounds), fungicides (and combined insecticide-fungicides) and rodenticides. There are 4 appendixes, one on commercial fruit spraying, and another comprising a list of the major pest control products in the British, U.S., and French zones of Germany, with their proprietary names and uses.

* British Intelligence Objectives Sub-Committee.

3470. JANCKE, O.
Versuche zur inneren Therapie. **(Investigations on internal therapeutics.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 89-91.

Experiments are mentioned with preparations containing bis-dimethyl-aminophosphoric acid anhydride which (1) are absorbed by leaves and roots and transported through the plants including fruit trees, (2) in the forms used are not toxic to the plants, (3) in a series of trials killed sucking insects on the test plants. A list of insects affected is given and plants on which the treatment was not effective are mentioned.

3471. STAPLEY, J. H.
Phosphorus insecticides and their uses.
Plant Prot. Overs. Rev., 1950, **1**: 4: 14-16.

Notes are given on the use of parathion on apples, plums, hops, and glasshouse crops.

3472. JANCKE, O.
E 605 forte und weinbaulicher Pflanzenschutz. **(E 605 forte for use in vineyards.)**
Höfchen Briefe, 1951, **4**: 94-6, bibl. 4.

Important pests of the grapevine controlled by E 605 forte include: *Phyllocoptes vitis*, *Eriophyes vitis*, *Tetranychus althaeae*, *Bytiscus betulae*, *Aspidiotus perniciosus* and other scale insects. The author, who is on the staff of the Neustadt Horticultural Institute, Baden, considers E 605 forte in 0·05 and 0·02% solutions less dangerous than nicotine except to those specially allergic to it.

3473. WILHELM, —.
Erfahrungen mit Solbar und E 605 forte zur Bekämpfung der Kräuselkrankheit und der Roten Spinne an Reben. **(Solbar and E 605 forte for the control of curly leaf disease and red spider on vines.)**
Höfchen Briefe, 1951, **4**: 96-102, illus.

In vineyards in Baden, south Germany, a thorough application of 5% Solbar early in March controlled the *Phyllocoptes* and *Epitrimerus* spp. which cause curly leaf. During the growing period 0·025% E 605 forte was found to control the mites, though somewhat less satisfactorily than the winter treatment. For red spider, *Paratetranychus pilosus* and *P. urticae*, control, both 5% Solbar and 0·1% E 605 forte or a combination of the two were found satisfactory, but to prevent re-infestation it is advisable either to remove or spray all vineyard weeds.

3474. RODRIAN, —.
Dreijährige praktische Versuche mit E 605 gegen Heu- und Sauerwurm. **(Three years' trials with E 605 against *Polychrosis*.)**
Höfchen Briefe, 1951, **4**: 102-9.

In trials at the Viticultural and Horticultural Research Station, Oppenheim on Rhine, both the first and second generation of *Polychrosis* were controlled by E 605 forte. Dusts were somewhat more effective than sprays. The addition of 0·5% bordeaux mixture and 100 g. of soap to 100 l. spray provided protection

against possible *Botrytis* attack and resulted in a longer residual action of E 605.

3475. Woodcock, D.
The insecticidal action of gamma-hexachlorocyclohexane.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 121-3, bibl. 15.
Hexamethyl- and hexaethylcyclohexanes have been synthesized but have proved inactive as contact insecticides against *Calandra granaria* L. The inadequacy of the Inositol Theory as an explanation of the insecticidal activity of γ-hexachlorocyclohexane is discussed. [Author's summary.]

3476. Mayer, A.
Wachstumsbeeinflussungen durch die Reinisomere des Hexachlorcyclohexan. (**The effect of the pure isomers of hexachlorocyclohexane on growth.**)
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 98-103, illus.
The effects of the pure isomers and of mixtures of isomers are described, the plant material being tradescantia cuttings, tomato plants, maize seedlings, peas and beans in flasks.

3477. Krister, C. J.
Methoxychlor.
Agric. Chemls, 1951, **6**: 7: 39-41, bibl. 17.
"Vegetable crops, such as snap and lima beans, squash, cucumbers, melons and tomatoes, head the list of those on which methoxychlor [the methoxy analogue of DDT] is useful. Its use on fruit crops, such as peaches, early apples, cherries, bramble fruits and grapes, holds considerable promise."

3478. Foster, A. C.
Some plant responses to certain insecticides in the soil.
Circ. U.S. Dep. Agric. **862,** 1951, pp. 41, bibl. 47.
This circular summarizes the results obtained primarily in studies with DDT but includes some data on BHC, chlordane, toxaphene and parathion. The technique used in the plot experiments is given in detail, the test plants being mostly vegetables. In general, DDT had but slight effect upon germination and stand, even among species that are sensitive after emergence; at concentrations of 400 and 1,000 lb. per acre, however, stands were significantly depressed. Technical BHC is generally harmful to germination and stand of all crops tested at 400 lb. per acre. Chlordane and toxaphene were harmful and relatively heavy doses of parathion appeared to have a slight but temporary depressing effect on germination and stand.

Spray deposit and damage.

(*See also* 3492g, m.)

3479. Adams, R. E., Pratt, R. M., and Terry, C. W.
A leaf punch for sampling foliage for analysis of spray deposits.
Phytopathology, 1951, **41**: 568-9, illus.
With the punch described, leaf discs are cut individually and dropped into a shell vial without being touched except with the punch. The sample is collected and prepared for analysis in one operation.

3480. Klingbeil, G. C., and Mitchell, A. E.
Evaluation of concentrate spray coverage on large apple trees by means of leaf prints.
Quart. Bull. Mich. agric. Exp. Stat., 1951, **33**: 302-9, bibl. 12, illus.
The use of double and quadruple spray concentrations, applied with a speed sprayer to large, pruned Delicious apple trees, resulted in uniform spray coverage throughout the tree and gave commercial control of apple scab and codling moth with very little fruit russeting. The build up of spray deposit on the leaves of the trees of the 4x treatment was greater than that of the 2x treatment. There was no saving of spray materials by concentrate applications in the first spray; for subsequent treatments, however, only ¾ of the normal amount of chemicals was required if concentrates were used.

3481. Decker, G. C., Weinman, C. J., and Bann, J. M.
A preliminary report on the rate of insecticide residue loss from treated plants.
J. econ. Ent., 1950, **43**: 919-27, bibl. 8.
The rate of loss of residues from the application of 7 insecticides to peaches and apples was studied through chemical and biological assays of samples taken at various intervals after spraying. Deposits of DDT related to rate of application were significantly higher than those of toxaphene and were far in excess of the more volatile compounds, showing that there must be a considerable loss of even slowly volatile materials during the actual spraying process. The results of laboratory studies under controlled conditions substantiated this assumption. Deposit also was affected by differences in formulation. [From authors' summary.]

3482. Ciferri, R., and Bertossi, F.
Presenza di insetticidi clororganici nell'olio delle olive trattate per la lotta contro la mosca olearia. (**The presence of chlororganic insecticides in the oil of olives treated for the control of the olive fly.**) [English summary 5 lines.]
Not. Mal. Piante, 1950, No. 12, pp. 56-8, bibl. 14.
The oil of olive trees treated with DDT, HCH, and chlordane contained from 2 to 5 p.p.m. of the chlororganic products after 5 treatments.

3483. Hough, W. S.
Effect of dormant sprays on apple trees.
Bull. Va agric. Exp. Stat. **423,** 1949, pp. 22, bibl. 16, illus. [received 1951].
Injury resulting from applying dormant oil sprays to apple trees was apparent in some seasons but not others. When it occurred it took the form of: (*a*) killing lateral buds on terminal shoots; only rarely were branches, spurs, or twigs killed outright; or (*b*) weakening buds, causing them to produce small leaves or weak bloom; or (*c*) delay in the appearance of leaves or bloom. Dormant oil with a dinitro (DN) compound added was more frequently injurious to buds than oil alone. Bud injury, when severe, was associated with oil emulsions of the quick breaking type, and was most evident when trees or parts of trees were

oversprayed at the beginning or at the end of a tank load.

3484. KASTING, R., AND WOODWARD, J. C.
Persistence and toxicity of parathion when added to the soil.
Sci. Agric., 1951, **31**: 133-8, bibl. 9, illus.
Parathion was applied at 2, 12 and 100 lb./acre to uncropped clay-loam soil maintained at 60% of its moisture-holding capacity. At 2 lb./acre parathion disappeared within 16 days, and at 100 lb./acre there was only a trace remaining after 165 days. Even the highest applications did not seriously affect the microbiological balance of the soil. Similar applications to pots sown with lettuce, oats and vetches did not affect yields, though the highest rate of application delayed lettuce seed germination. At 40 days after sowing there were appreciable amounts of parathion in the plants, but at harvest only traces remained and, though a biological test (using bulked benzene plant extracts to which pomace flies were exposed) was carried out, the quantities detected were not sufficient to be toxic. Parathion supplied additional phosphorus to the plants. C.W.S.H.

3485. DAVID, A., AND OTHERS.
Studies on commercial octamethylpyrophosphoramide (Schradan). II.—Determination of toxic residues.
J. Sci. Food Agric., 1951, **2**: 310-14, bibl. 7.
A method of determining small traces of the insecticide in treated crops, including lettuce, is described and the validity of the method for assessment of toxic risk to the consumer is discussed.

3486. KESSLER, H.
Eine ungewöhnliche Fleckenbildung auf Glockenäpfeln. **(An unusual spotting on the apple variety Glockenapfel.)**
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 259-61, illus.
In late 1950, 0·5 to 1 mm. deeply sunk brown-black spots were observed on this popular Swiss apple in storage. The flesh was in no case affected, and it is thought the symptom was caused by a spray ingredient, presumably arsenic.

3487. VIDALI, A.
Causticità degli olii invernali con o senza ossidulo di rame nei trattamenti al pesco. **(The causticity of winter oils with or without copper oxide in the treatment of peaches.)**
Not. Mal. Piante, 1950, No. 12, pp. 51-6.
Two winter oils, Vernolio and Veralin 6, applied to peaches in spring caused scorching of the leaves even at 1%, when used with or without the copper preparation Rame Sandoz. They should be applied only while the buds are dormant.

3488. SERVAZZI, O.
Osservazioni preliminari sull' "annerimento interno" delle castagne. **(Preliminary observations on an internal blackening of chestnuts.)**
Not. Mal. Piante, 1950, No. 13, pp. 66-70.
An "internal blackening" of chestnuts exported from Piedmont to the United States, showing as a discoloration of the walls of the inter-cotyledonary cavity, is described. From trials recorded it is concluded that the discoloration is mostly due to the compulsory warm water treatment given to kill the codling moth and nut weevil larvae infesting the nuts.

Spray apparatus.

(*See also* 3228v, w.)

3489. KEARNS, H. G. H., AND MORGAN, N. G.
A general purpose wheeled manual sprayer.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 138-43, bibl. 1, illus.
The manual machine here fully described should be suitable for a wide range of duties including the spraying of buildings with insecticides to control mosquitoes or spray trials on ground and small bush crops. The weight of the machine less lances and hoses is, for the stirrup pump model 86 lb., and for the beam pump model 96 lb.

3490. GARTON, J. E.
A graphic solution for mast type orchard sprayer problems.
Misc. Publ. Okla agric. Exp. Stat. **MP-21**, 1951, pp. 4, illus
The major variables involved in orchard spraying are: (1) gallons of spray material applied to each tree; (2) spread of tree; (3) speed of sprayer; (4) number of nozzles in operation per row; (5) discharge per nozzle. A graph is presented from which any one of these variables can be calculated provided the others are known.

3491. KEARNS. H. G. H., AND MORGAN, N. G.
An experimental "air flow" small volume sprayer and duster. Abridged specification.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 132-7, bibl. 1, illus.
The machine which is very thoroughly described and illustrated is a modified model specially designed for experimental work on the control of locusts.

Noted.

3492.

a ABEL, A. L.
Controlling strawberry virus.
Fruitgrower, 1951, No. 2885, p. 665.
A note on the use of Pestox 3 by one of the firm manufacturing it.

b ARCENEAUX, C. J.
Microscopic analysis of benzene hexachloride.
Analyt. Chem., 1951, **23**: 906-11, bibl. 12, illus.

c ARNAUD, G.
La valeur pratique des essais d'anticryptogamiques viticoles. **(The practical value of fungicides on vines.)**
Ann. Épiphyt., 1946, **12**: 203-8 [received 1951].

d BALDACCI, E.
Relazione sul servizio delle reti degli osservatori peronosporici nell' oltrepo' pavese durante il 1950. **(Report of vine mildew observers in Pavese north of the Po in 1950.)** [English summary 5 lines.]
Not. Mal. Piante, 1951, No. 14, pp. 47-51.

e BLUMER, S.
Die Bekämpfung der Krankheiten und Schädlinge im Rebbau. **(Disease and pest control in viticulture [in Switzerland].)**
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 173-9, illus.

f BUSTINZA, F.
Antibacterial substances from lichens.
Endeavour, 1951, **10**: 95-9, bibl. 23, illus.
A review.

g CHISHOLM, R. D., AND OTHERS.
DDT residues in soil.
J. econ. Ent., 1950, **43**: 941-2, bibl. 3.
Under apple and peach trees.

h COATON, W. G. H.
Termites and their control in cultivated areas in South Africa.
Bull. Dep. Agric. S. Afr. **305**, 1950, pp. 28, bibl. 6, illus., 3d.

i CONWAY, T.
Pests and diseases of fruit trees in New Zealand.
N.Z. J. Agric., 1951, **82**: 159-64, bibl. 7, illus.

j FISCHER, H.
Pflanzenkrankheiten in der Baumschule durch Spurenelementmangel. **(Nursery disorders due to trace element deficiency [in particular Mg, Mn, Zn, B and Fe].)**
Dtsch. Baumsch., 1951, **3**: 94, 96-100.

k HARDY, D. E.
The Krauss collection of Australian fruit flies (Tephritidae-Diptera).
Pacific Sci., 1951, **5**: 115-89, bibl. 50, illus.
Detailed descriptions of 32 species.

l HARTLEY, G. S., AND OTHERS.
Studies on commercial octamethylpyrophosphoramide (Schradan*). I.—Composition and analysis.
J. Sci. Food Agric., 1951, **2**: 303-9, bibl. 20.

m HILLENBRAND, E. F., Jr., SUTHERLAND, W. W., AND HOGSETT, J. N.
Determination of residual glyoxalidine fungicides on apples and cherries.
Analyt. Chem., 1951, **23**: 626-9, bibl. 4.

n HUECK, H. J.
Influence of light upon the hatching of winter-eggs of the fruit tree red spider.
Nature, 1951, **167**: 993-4, bibl. 3.

* Name approved by the British Standards Institution, Technical Committee for Pest Control Products.

o KOTTE, W.
Über das Vorkommen der durch *Pseudomonas juglandis* Pierce verursachten Walnusskrankheit in Deutschland. **(Walnut bacterial blight appears in Germany.)**
Phytopath. Z., 1951, **17**: 347-52, bibl. 7, illus.

p LIMASSET, P., AND DE MONTGREMIER, H. A.
La microméthode sérologique pour l'étude des viroses végétales. **(A serological micromethod for the study of plant viruses.)**
Ann. Épiphyt., 1947, **13**: 173-85, bibl. 37, illus. [received 1951].

q MCLEOD, W. S.
Present status of orchard acaricides in Canada.
Sci. Serv. Res. Notes Ser. Ent. **E.6**, 1951, pp. 10.
"Not for further publication without permission of the author", at the Fruit Insect Investigations Unit, Ottawa.

r MALLINJOUD, H.
Observations sur la biologie du carpocapse (*Laspeyresia pomonella*) en Savoie en 1947, 1948, 1949, et 1950. **(Observations on the biology of the codling moth in Savoy in 1947, 1948, 1949 and 1950.)**
Rev. hort. Paris, 1951, **123**: 447-8.
As a first step towards warning growers when to spray.

s MALLINJOUD, H.
Nouvelles observations biologiques relatives aux pucerons verts du pêcher et du prunier (*Myzus persicae* Sulz. et *Hyaloperus pruni* F.). **(New biological observations on peach and plum aphids.)**
Rev. hort. Paris, 1951, **123**: 501.

t MINISTRY OF AGRICULTURE AND FISHERIES AND DEPARTMENT OF AGRICULTURE FOR SCOTLAND.
Crop protection products approval scheme. Approved list 1951.
[*Publ.*] *Minist. Agric., Lond.*, 1951, pp. 9.

u RIPPER, W. E.
The outlook for systemic insecticides.
Down to Earth, 1950, **6**: 3: 13-16, illus.

v SAVARY, A.
La lutte contre les pucerons en période de végétation. **(Aphid control [on fruit trees] during the growing season.)**
Rev. romande Agric. Vitic., 1951, **7**: 35-8, illus.

w SCHELLENBERG, A.
Genossenschaftliche Spritzanlagen im Kanton Zürich. **(Co-operative spraying plants in Canton Zürich.)**
Schweiz. Z. Obst- u. Weinb., 1951, **60**: 121-7, bibl. 4, illus.

x STARNES, O., REED, J., AND FULMER, R. S.
An improved soil fumigant applicator.
Down to Earth, 1951, **7**: 1: 8, illus.

y STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Sygdomme og skadedyr på hindbaer. **(Diseases and pests of raspberries.)**
Sygdomme og skadedyr på ribs. **(Diseases and pests of red currants.)**
Sygdomme og skadedyr på solbaer. **(Diseases and pests of black currants.)**
Tidsskr. Planteavl, 1950, **54**: 136-40, 141-4 and 145-8, illus., being *Medd. Stat. Forsøgsvirks. Plantekult.* **437-439.**

z THIEM, H.
Über den derzeitigen Stand der Maikäferbekämpfung in Deutschland. **(The present status of cockchafer control in Germany.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1951, **3**: 40-2, illus.

3493.
a ROBB, J.
The seasonal incidence of the codling moth (*Cydia pomonella* L.) in the Manawatu.
N.Z. J. Sci. Tech. Sect. A., 1950 [issued March 1951], **31**: 5: 15-22, bibl. 2, illus.

WEEDS AND WEED CONTROL.

General.

(*See also* 3559d, m, 4095, 4135.)

3494. SNIJDERS, J. H.
Aspecten van het onderzoek naar de positieve waarde van onkruiden. **(Some aspects of research on the positive value of weeds.)**
Bergcultures, 1950, **19**: 391-401, bibl. 6.
A review of the work done in Holland and Indonesia on the value of weeds in agriculture, both as soil improvers and as indicators of soil conditions.

3495. U.S. DEPARTMENT OF AGRICULTURE, DIVISION OF WEED INVESTIGATIONS.
Bibliography of weed investigations for 1950.*
[*Publ.*] *U.S. Dep. Agric.*, 1951, pp. 111, Plant Industry Station, Beltsville, Md.
This publication represents the first attempt to list the many articles, both technical and popular, in the field of weed investigations throughout the world. It is concerned mainly with papers published in 1950, and the extent of these may be judged by an examination of the contents, as follows:

I. *Economic aspects and general weed problems*, 175 refs.
II. *Botany of weeds.*
  A. Classification and identification, 38 refs.
  B. Ecological investigations and surveys, 330 refs.
  C. Physiological investigations, 233 refs.
  D. Morphological and anatomical investigations, 13 refs.
  E. Weed seed investigations, 52 refs.
III. *Weed control.*
  A. Cultural, 71 refs.
  B. Chemical:
    1. Weeds in field crops, 325 refs.
    2. Weeds in horticulture, ornamental and vegetable crops, 150 refs.
    3. Weeds in grasslands, including grass-legume pastures, rangeland, turf, lawns and cemeteries, 50 refs.
    4. Weeds in specialized areas, including ditch banks, canal ditches, fence rows, etc., 29 refs.
    5. Woody plants, 122 refs.
    6. Aquatic weeds, 39 refs.
    7. Specific weeds, 198 refs.
  C. Biological, 7 refs.
IV. *Chemical and biochemical investigations*, 73 refs.
V. *Special characteristics of weeds.*
  A. Poisonous plants and their control, 63 refs.
  B. Uses of weeds, 36 refs.
  C. Pathological relationships, 5 refs.
VI. *Nature and properties of chemicals used as herbicides*, 181 refs.
VII. *Effect of herbicides on soils, livestock, and humans*, 94 refs.
VIII. *Equipment, methods of application, and herbicidal calculations*, 114 refs.
IX. *Legal aspects*, 30 refs.

It is planned in future to issue additional bibliographies quarterly, and it is hoped, too, to continue the present policy of supplying them free of cost to anyone applying to be put on the mailing list. The bibliographies are bound to be of great assistance to persons working on weed problems, but one cannot help suspecting that many workers would prefer a rather more selective list from which purely popular material is eliminated, and which includes brief notes on at least those papers the titles of which give little or no indication of the nature of the contents.

* A second issue has now been made covering Jan.-March 1951, pp. 41.

3496. N.E. WEED CONTROL CONFERENCE COORDINATING COMMITTEE.
Report of the coordinating committee of the N.E.W.C.C. for 1951.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 7-27.
Changes of horticultural interest made since the last report [see *H.A.*, 21: 1542] include agreements reached on the desirability of certain weed control measures in lowbush blueberries, cranberries, brambles, potatoes, orchards, vineyards and strawberries.

3497. TINGEY, D. C., AND TIMMONS, F. L.
Weeds : methods for their control and eradication.
Circ. Utah agric. Exp. Stat. **127**, [1951 ?], pp. 47.
The subject is reviewed under the following headings: supplemental methods; eradication of creeping perennials where infestation is general, or where it is local, and follow-up treatments; control of annual weeds in specific crops [including potatoes, carrots, peas and onions]; weed control on non-arable land; woody plants and aquatic weeds; spray equipment; tabulated summary of control methods; and reaction of weeds to 2,4-D.

3498. HOLMES, E.
Modern methods of weed control.
J. roy. hort. Soc., 1951, **76**: 207-16.
The present position in chemical weed control is surveyed, and some indications are given of the direction in which further developments may be expected.

Poisonous plants.

3499. CONNOR, H. E., AND ADAMS, N. M.
The poisonous plants in New Zealand.
Bull. Dep. sci. industr. Res. N.Z. **99**, 1951, pp. 141, bibl. 124, illus.
Concise botanical descriptions are given of a large number of species of plants, both native and introduced, with notes on their distribution in New Zealand, symptoms of poisoning in livestock and the poisonous principle where this is known. Miss Adams's excellent drawings of many plants are a notable feature of the treatise.

Herbicides.

(*See also* 3294, 3559c, g, k, l, o, q, t, u, 3972.)

3500. ALDRICH, R. J.
A field technique for screening new herbicides.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 29-30.
At the New Jersey Agricultural Experiment Station in 1950 53 field and vegetable crops were planted in single rows 300 ft. long and 42 in. apart. Three feet wide strips of the experimental herbicides were applied at right angles to the rows crossing all 53 species. A 1-ft. border between pre-emergence and 3-ft. border between post-emergence plots was used as control. The most promising results are briefly discussed.

3501. LING, L.
Weed control by growth-regulating substances.
F.A.O. Study **13**, Washington, 1951, pp. 36, bibl. 45, 50c.
A convenient guide to the use of hormone weedkillers, summarizing some of the very extensive relevant literature. The commercially available forms of 2,4-D, MCPA, 2,4,5-T, TCA and IPC are enumerated, their selectivity is discussed, and dosages and methods of application are suggested. General recommendations are made for the control of annual, perennial and aquatic weeds, woody plants and grasses, and for weed control in specific crops, mainly agricultural.

3502. RADEMACHER, B.
Der derzeitige Stand der Forschung über die Anwendung von Wuchsstoffen als Herbizide. **(The present position regarding investigations on the application of growth substances as herbicides.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 33-40, illus.
A review of the subject with special reference to the action and use of Methoxone, 2,4-D, 2,4,5-T, and IPC.

3503. BLACKMAN, G. E., TEMPLEMAN, W. G., AND HALLIDAY, D. J.
Herbicides and selective phytotoxicity. Parts I and II.
Annu. Rev. Plant Physiol., 1951, **2**: 199-230, bibl. 330.
Blackman in the first part of this paper is mainly concerned with the dinitro-alkylphenols and general aspects of phytotoxicity, the other two authors with plant growth regulators and their effects on plants.

3504. LINDER, P. J.
Absorption of some new herbicides by plants.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 7-12.
Results of trials at Beltsville, Maryland, have shown that the 6 herbicides used were most readily absorbed and translocated when applied by the following methods: Sodium 2,4-D ethyl sulphate: application to the roots; 3,6-endoxohydrophthalate: stem and root applications; maleic hydrazide: root, stem and leaf applications; IPC and "chloro" IPC: soil application to germinating seeds or seedlings; phenyl mercuric acetate: application to soil or to leaves of young grass; methoxone (2-methyl-4-chloro-phenoxy-acetic acid): soil application.

3505. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forskellige kemikaliers virkning på ukrudtsplanter. **(The action of herbicides on weeds.)**
Tidsskr. Planteavl, 1950, **54**: 164-7, being *Medd. Stat. Forsøgsvirks. Plantekult.* **446.**
The response of many common weed plants to copper sprays, DNC and two hormone weed killers is briefly recorded and discussed.

3506. COCK, R. E.
Chemical weed control.
Tasm. J. Agric., 1951, **22**: 64-9, bibl. 1.
This is a general account of weed control with lists showing weeds susceptible, and resistant, to 2,4-D and MCPA. Notes are also given on crops susceptible to, and crops suitable for, spraying, and on preparations and sprays for "harder-to-kill" weeds (mentioning particularly 2,4,5-T).

3507. HERNANDEZ, T. P., AND WARREN, G. F.
Some factors affecting the rate of inactivation and leaching of 2,4-D in different soils.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 287-93, bibl. 8.
1. In greenhouse experiments 2,4-D in the soil was still toxic, as measured by response of cabbage seeds, after eight weeks of storage at 40° F., but at temperatures of 59° and 65° to 90° F., 2,4-D in the soil was completely inactivated after four weeks. 2. In air-dried peat soil 2,4-D was still toxic after 18 weeks of storage but in moist and water-saturated soil it was inactivated at the end of four weeks. 3. In sterilized moist soil 2,4-D was still toxic at the end of 12 weeks of storage; however, in unsterilized soil 2,4-D was inactivated at the end of four weeks. 4. In soils low in organic matter 2,4-D was found to leach much more readily

than in soils high in organic matter. [Authors' summary.]—Dep. Hort., Wisconsin.

3508. Mullison, W. R., Coulter, L. L., and Barrons, K. C.
Comparative herbicidal effectiveness of certain alkyl and glycol esters of 2,4-D and 2,4,5-T.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 87-94, bibl. 3.
Both laboratory and field techniques were used in this study, and in the field trials with herbaceous and woody plants, particularly of resistant species, the glycol butyl ether esters of 2,4-D and 2,4,5-T appeared to be superior to the alkyl esters.

3509. Clark, H. E., and Freiberg, S. R.
Some effects of concentration of 2,4-D and pH of solution upon plant responses.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 19-27, bibl. 17.
When soybean plants were treated with 2,4-D added to nutrient solutions in which the plants were growing, responses occurred which suggested that a rapid systemic distribution of 2,4-D within the plant followed absorption of the compound by the roots. The pH of the nutrient solution during exposure to 2,4-D influenced the intensity of responses shown, presumably by influencing the rate of absorption of the compound. Both stimulating and inhibiting effects were noted. Different concentrations of 2,4-D were required to produce different responses. A number of responses were produced by a certain minimum concentration, but inhibited by a higher concentration of 2,4-D. Responses generally occurred independently of each other, although the loss of capacity for active water absorption by roots may have affected the water economy of the plant. [Authors' conclusion.]

3510. Möller Nielsen, H.
Effect of hormone derivatives on cultivated plants. III. Reaction of various cultivated species to 2,4-D and 4K-2M.
Yearb. roy. vet. agric. Coll. Copenhagen, 1951, pp. 108-56, bibl. 28, illus.
Experiments were carried out in 1947-50 to determine the effect of using different amounts of hormone derivatives on agricultural plants. The derivatives used were the Na-salt of 4K-2M (Agroxone, Dicotox) and 2,4-D (Herbatox, Herbatox D), $\frac{1}{16}$, $\frac{1}{4}$, 1, 4 and 16 kg. per ha. being applied in the form of sprays. The treatments on the whole caused yield depression, though the 2 lightest applications had stimulating effects on some of the 27 species tested. In 1947-48 2,4-D had much more effect on most species than 4K-2M; in 1949-50, however, the differences were not so pronounced and some of the crops were more resistant to 2,4-D than to 4K-2M. Abnormalities caused by the treatments included curvature in stems and leaves of broad beans, peas, potatoes and poppies; brittleness and thickening of the lower leaves of peas; fasciation or consolidation and enclosure of the tips of the shoots in carrots and to a lesser extent in potatoes; and serious deformation in carrots.

3511. King, L. J., and Kramer, J. A., Jr.
Studies on the herbicidal properties and volatility of some polyethylene and polypropylene glycol esters of 2,4-D and 2,4,5-T.
Contr. Boyce Thompson Inst., 1951, **16**: 267-78, bibl. 17.
Some new 2,4-D polyethylene glycol diesters.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 31-4.
Esters of 2,4-D and 2,4,5-T have caused injury to nearby crop plants by vapour drift. Experiments were carried out with polyethylene glycol esters which showed that these esters did not injure unsprayed plants adjacent to sprayed plants, whereas such unsprayed plants were severely damaged by vapour from butyl esters. Similarly cucumber seeds were not injured by storage near these glycol esters, but were appreciably injured by storage near butyl esters. Several tests were carried out to compare polyethylene glycol esters and polypropylene glycol esters with other 2,4-D and 2,4,5-T derivatives, and in all cases these glycol esters compared very favourably with the other derivatives.
C.W.S.H.

3512. Tischler, N., Quimba, G. P., and Bejuki, W. M.
Activators which considerably increase the defoliant and the phytotoxic properties of Endothal.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 35-44, bibl. 4.
Of the ammonium salts of sulphuric, hydrochloric, nitric and phosphoric acids, used as adjuvants for Endothal, disodium 3,6-endoxohexahydrophthalate [see *H.A.*, 21: 1552], ammonium sulphate has proved most suitable for practical use. A wetting agent, Nonic 218, has been found to increase the effectiveness of both Endothal alone and its ammonium sulphate formulations. Hydrocarbon oils, used in emulsion form with ammonium sulphate, have shown further promise of economically improving Endothal. The inherent phytotoxic value of Endothal, as indicated by comparative injection experiments into bean plants, has been found to be equal to or even greater than that of the sodium salt of 2,4-D. [From authors' conclusions.]

3513. Barrons, K. C., and Hummer, R. W.
Basic herbicidal studies with derivatives of TCA.
Agric. Chemls, 1951, **6**: 6: 48-50, 113-21, bibl. 12.
1. A simple chemical test for TCA (trichloroacetic acid) was developed using pyridine and sodium hydroxide as reagents. 2. Several biological test methods for soil residues of TCA were used. Wheat and soybeans gave response at low rates and made rough quantitative estimations possible. 3. The occurrence of two physiologic responses, (*a*) foliar contact and (*b*) systemic, were experimentally established. Various symptoms of the systemic effect are described. 4. Absorption by underground parts was established as being the primary avenue of entry of TCA for the plants tested. 5. Leaching and decomposition were both found to be possible factors in the disappearance of TCA from soils. 6. Analysis of soils and plant sap indicated that there

is uptake of TCA by both tolerant and susceptible species which will result in a lowered TCA content of the soil. Tolerant species had a relatively high TCA content in the sap and susceptible species a low content indicating that the latter utilize TCA in their metabolism. 7. In certain tests TCA had a greater effect on grass low in carbohydrate reserves than on grass higher in carbohydrates. 8. Various salts of TCA and esters of TCA having low vapour pressures were found equal to sodium TCA in systemic effect on certain grasses. Esters having a relatively high vapour pressure were inferior apparently because of loss from volatilization. 9. A wide variation in the relative tolerance of crops was found. Tolerant, intermediate and susceptible crops are listed. [Authors' summary.]

3514. Crafts, A. S., Currier, H. B., and Day, B. E.
Response of several crop plants and weeds to maleic hydrazide.
Hilgardia, 1950, **20**: 57-80, bibl. 5, illus.

A water soluble diethanolamine salt containing 30% maleic hydrazide by weight was diluted to concentrations of 0·0, 0·1, 0·2, 0·4 and 0·8% and sprayed on to a number of plants, which included carrot, lettuce, tomato, Lima bean, cucumber, cantaloupe, water melon, squash, sweet corn and the weeds Johnson grass (*Sorghum halepensis*) and water grass (*Echinochloa crus-galli*). Young plants, both of crops and grasses, proved more susceptible to injury than older plants. The grasses were particularly susceptible, young plants of both species being killed by the 0·2% concentration and the growth of older plants of Johnson grass being inhibited completely throughout one season. With all types of plant, growth inhibition seemed to be the principal reaction following spraying with the higher concentrations. At the lower concentrations many abnormalities appeared, those on tomato resembling virus symptoms. Anthocyanin pigmentation, due possibly to carbohydrate accumulation in the leaves, was a common response. The addition of the spreader Vatsol at 0·024% increased effectiveness. Maleic hydrazide apparently acts on plant meristems at a distance from the point of application, and it is concluded that it has hormonal properties. It is considered to show promise as a herbicide against weed grasses.

3515. Witman, E. D., and Newton, W. F.
Chloro IPC—a new herbicide.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 45-6, bibl. 2.

While only little is known of the effectiveness of isopropyl N-(3-chlorophenyl) carbamate under field conditions, it may be considered as a chemical showing possibilities as a selective herbicide with greater residual activity than regular IPC and with a somewhat modified range of selectivity.

3516. Loustalot, A. J., and Ferrer, R.
The effect of some environmental factors on the persistence of sodium pentachlorophenate in the soil.*
Proc. Amer. Soc. hort. Sci., 1950, **56**: 294-8, bibl. 2.

* See also *H.A.*, 20: 211.

In greenhouse experiments at Mayagüez, Puerto Rico, soils treated with 4 rates of sodium pentachlorophenate were stored at 3 temperatures and at 3 moisture levels for 0, ½, 1 and 2 months before being planted with corn and cucumbers to determine the persistence of the herbicide. The effect of soil texture was also examined. The growth of the crop plants was determined 3 weeks after planting. The data obtained showed that, in general, the toxicity of the herbicide decreased with time, the rate and degree of inactivation being greatest at the higher temperatures. There was no appreciable inactivation after 2 months when the material was applied to air-dry soil. It persisted somewhat longer in soil with a medium water content than in saturated soil, and in heavy clay soil than in lighter soils.

3517. Meurman, O.
Ogräsutrotning i fruktträdgården med klorathaltiga medel. **(Potassium chlorate for weed control in orchards.)**
Sver. pomol. Fören. Årsskr., 1950, **51**: 217-20.

Several years' trials with the Finnish herbicide Fekabit, a by-product which contains potassium chlorate, showed that it controls perennial orchard weeds without causing injury to apple trees. The compound was applied at rates of 300, 600 and 900 g. per 4 m² around the tree. In small-scale experiments it also proved successful for weed control among certain ornamentals.—Finnish Horticultural Research Station, Piikkiö.

3518. Veersema, J.
Natrium-arseniet voor onkruidbestrijding. **(Sodium arsenite for weed control.)**
Bergcultures, 1950, **19**: 251-2, illus.

A grower describes his successful experiences with sodium arsenite in clearing ground of alang-alang and in controlling ferns in rubber plantations. A note by the C. P. V. Experiment Station on the dangers of using sodium arsenite in rubber plantations is appended.

3519. Gonggrijp, J.
Het gebruik van minerale oliën voor bestrijding van onkruid. **(The use of mineral oils as herbicides.)** [English summary ½ p.]
Reprinted from *Landbouwk. Tijdschr.*, 1951, **63**: 103-16, bibl. 24.

The relationship between the chemical and physical properties of mineral oils and their herbicidal activity was studied at the Royal Shell Laboratory, Amsterdam, and it was found that, in general, activity increases with increase in the content of sulphonatable compounds and boiling point but is limited by the viscosity. Carrots tolerate the acute toxicity of oil fractions containing limited amounts of aromatics and having a boiling range below 550° F., but are susceptible to the chronic toxicity of oil fractions with a boiling range above 550° F. The selective herbicidal action of an oil boiling below that temperature is dependent on the ratio between aromatics and non-phytotoxic components, and not on the amount of aromatics applied per unit area. On the basis of these results an oil herbicide for use in carrots, celery and parsley was developed.

Particular weeds.

(*See also* 3559a, b, h, i.)

3520. ANON.
Noxious weeds of United States.
Seed Trade Buyers' Guide, 1951, **34**: 18-22.
A comprehensive list is presented of weeds considered noxious by individual States of the U.S.A. and the District of Columbia. The weeds are listed under common names, with many cross references and Latin names in brackets. The States legislating against a particular weed are cited in each instance.

3521. (ORCHARD, H. E.)
Good kills of bindweed obtained by hormone spraying.
J. Dep. Agric. S. Aust., 1951, **54**: 296.
Both MCPA and 2,4-D are effective against field bindweed (*Convolvulus arvensis*). Spraying the weed near fruit trees, shrubs, vines, etc., should only be carried out on calm days and only the (non-volatile) sodium or amine salt formations should be used.

3522. [AGRICULTURAL DEPARTMENT, S. AUSTRALIA.]
Many brands of blackberry-killing hormone available in South Australia.
J. Dep. Agric. S. Aust., 1951, **54**: 318.
This is a table of 11 materials containing 2,4,5-T available in South Australia, showing brand, active ingredients (lb. per gal.) and the manufacturers' recommended dilution.

3523. LOUSTALOT, A. J.
The control of grasses in newly planted sugar cane with TCA.
Sugar J., 1951, **13**: 9: 23, illus.
An experiment at Mayagüez, Puerto Rico, showed that 60% sodium TCA applied at the rate of 100 lb. per acre before planting killed or kept in check most of the grass weeds in sugar cane. When used in combination with 2,4-D it controlled almost all weeds which develop before the cane closes over.

3524. MARCELLI, E.
Risultati di un secondo anno di prove di lotta contro il *Cyperus rotundus* L. con " 2,4-D ". **(Results of a second year's trials on the control of *Cyperus rotundus* with 2,4-D.)** [English summary 6 lines.]
Not. Mal. Piante, 1951, No. 14, pp. 20-6, bibl. 7.
A mortality of 85% in *Cyperus rotundus* (nutgrass) was obtained with 5 treatments of 2,4-D at 21 and 14 kg. per ha., the mortality decreasing with smaller doses or fewer treatments. The safe interval for tobacco culture after using 12·6 kg./ha. is 8-9 weeks.

3525. BARTON, L. V., AND HOTCHKISS, J. E.
Germination of seeds of *Eichhornia crassipes* Solms.
Contr. Boyce Thompson Inst., 1951, **16**: 215-20, bibl. 4.
Although the vegetative parts of water hyacinth may now be controlled by chemicals, the problem of reinfestation by seedlings remains. Greenhouse and laboratory experiments were therefore carried out to determine the germination requirements of the seed. It appears that a combination of high temperatures and light is needed for complete germination of dormant seeds. A temperature as low as 5° C., however, for periods of 8 hours a day did not impair germination, and daily alternating temperatures of 5°-30° C. or 5°-40° C. permitted some germination in the dark. 20°-30° C. was the best temperature for keeping seeds viable in water for a long period. After 17 months of storage in water at this temperature the seeds became less dormant and germinated over a wider range of temperatures, but alternating low and high temperatures or greenhouse conditions were still the best. In all cases the speed of germination was increased by a storage period of a month or longer, and the percentage germination of slightly immature seeds was greatly increased by this treatment.

3526. GOODCHILD, N. E.
Control of lantana by cultural methods in the Mackay district.
Qd agric. J., 1951, **72**: 11-16, illus.
Lantana, introduced as a flowering shrub, has become a major weed in parts of Queensland. Where land can be cleared mechanically with bulldozers it has been found that regrowth can be stopped by establishing a good cover of kikuyu grass. Another successful method is to establish Guinea grass, *Panicum maximum*, through the lantana and fire it when a good bulk of grass has developed. Methods and costs are indicated.

3527. ANTOGNINI, J.
The effect of temperature, relative humidity and wind on the control of purslane with aero cyanate.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 125-9.
In trials at Cornell, the effectiveness of Aero Cyanate, trade name for potassium cyanate, against purslane, *Portulaca oleracea*, was greater the higher the relative humidity, and the lower the temperature and wind velocity, presumably as the result of slower evaporation.

Control of woody weeds and shrubs.

3528. ORCHARD, H. E.
Boxthorn growth cheaply countered with common salt.
J. Dep. Agric. S. Aust., 1951, **54**: 335.
The advice for the destruction of boxthorn (*Lycium ferocissimum*) is as follows: Hack into the base of the bigger bushes so that the main stems are accessible; cut these as near to ground level as possible and put an ounce or so of common salt on the cut surfaces of the butts remaining in the ground; heap and burn the top growth when sufficiently dry. Arsenic pentoxide solution (3 lb. of granulated arsenic pentoxide to 5 gal. water) sprayed on with either knapsack or power sprayer is still the most efficient killer for smaller bushes and regrowth.

3529. CARLSON, A. E.
An evaluation of foliage application of herbicides for brush control.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 67-70.

The herbicides discussed in this paper are 2,4-D, 2,4,5-T, a combination of the two, and Ammate.

3530. MATTHEWS, L. J.
Hormone weedkillers for scrub control: interim conclusions from departmental experiments.
N.Z. J. Agric., 1951, **82**: 11-14, illus.
This article summarizes conclusions based on experiments on the control of "brush" plants in New Zealand with 2,4,5-T. A table of materials tested shows the class of weedkiller, the proprietary name, the acid equivalent (as 2,4,5-T or 2,4-D) per gal., the form of weedkiller (oil or water based), and whether volatile or non-volatile. The report is chiefly on the control of gorse at different stages of growth, but other scrub plants are mentioned including blackberry (mainly *Rubus fruticosus*).

3531. PRIDHAM, A. M. S.
Progress report on control of woody weeds in winter.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 243-6.
Seedling *Fraxinus americana* up to an inch in diameter and 10 feet in height have been killed by basal spraying during the late winter. For this purpose a spray of 2,4,5-T mixed with oil in the ratio of 1 volume of 2,4,5-T (approximately 40%) to 3 volumes or less of fuel oil gave good results when used as an over-all spray at 60 gallons to the acre. Cutting of small brush did not enhance the effectiveness of 2,4,5-T, but does appear to be of value for efficient herbicidal action on plants of four inch D.B.H. and larger. Effectiveness of 2,4,5-T seems greatest with mixtures of the methyl and isopropyl esters. [Author's summary.]

3532. POUND, C. E.
Physiological effects of certain weedicides on *Rhus toxicodendron* L.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 319-20.
Effects caused by 2,4-D, 2,4,5-T and sodium pentachlorophenate are briefly noted.

3533. BUCKLEY, T. A.
Notes on the control of trees and weeds by phytocides.
Malay. agric. J., 1951, **34**: 27-31.
This is a short summary of experience in Malaya with phytocides applied to forest trees, old plantation trees such as rubber and oil palms, and weeds. Sodium arsenite has been used successfully for killing rubber and oil palm prior to replanting. In killing forest trees some difficulty has been experienced with the larger buttressed species. The most important weed of Malaya, lalang (*Imperata cylindrica*), is controlled by sodium arsenite but not by hormone weed-killers. Other weed-killers are being tried. *Melastoma malabathricium* is controlled by sodium arsenite or by slashing. *Mimosa pudica* and nut-grass (*Cyperus rotundus*) are only partially controlled by 2,4-D. In water courses, the grasses and sedges are not easily controlled, but water hyacinth, *Eichhornia crassipes*, is easily killed by 2,4-D. C.W.S.H.

Weed control in fruit crops.

(*See also* 3559e.)

3534. CROSS, C. E.
Recent developments in cranberry weed control.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 73-5.
A brief report from the Cranberry Experiment Station, Massachusetts, on work with 2,4-D, Stoddard Solvent, and copper sulphate solutions.

3535. CURTIS, O. F., Jr.
Weed control in nursery tree rows.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf., 1951, New York, pp. 119-25.
In trials in New York dinitro sprays or low volume dinitro concentrates used continuously over 3 years resulted in as good growth as did hoeing in nursery rows of apples. Quack [couch] grass (*Agropyron repens*) and other perennial grasses, however, recovered very soon from the effect of the dinitros, and for their control fuel oil No. 2 applied liberally but without wetting the tree trunks was found satisfactory.

3536. CURTIS, O. F., Jr.
Maleic hydrazide for grass control in fruit plantings.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 115-17, bibl. 2.
Foliar application of maleic hydrazide at the rate of 6 lb. per acre suppressed the growth of quack [couch] grass (*Agropyron repens*) and other grasses and broad leaved weeds for 2 months or longer, without affecting the growth of young apple trees.

3537. SNYDER, W. E.
Responses of quack grass (*Agropyron repens*) to treatment with maleic hydrazide.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 255-65, bibl. 2.
Good results were obtained by the numerous pre-emergence and foliar applications made at Cornell.

3538. HEMPHILL, D. D.
New weed control practices in strawberries.
Circ. Mo. agric. Exp. Stat. **355**, 1951, pp. 4, illus.
Recommendations are made for the application of the amine salt of 2,4-D for pre-planting, summer, and autumn treatments to control broad leaved weeds in strawberries, while geese are suggested for keeping down different sorts of grass. The use of various mulches was also found effective in weed control.

3539. DANIELSON, L. L., AND HOFMASTER, R. N.
Progress of strawberry weed control in Virginia. Simultaneous control of winter weeds and two spotted spider mite in Blakemore strawberries with dinitro ortho secondary amyl phenol.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 53-63, bibl. 8.
In cold winters a single application of one quart of 75% DNOSAP and 6·5 or 15 gal. of kerosene, made up by water to 100 gal. and used at the rates of 25, 50 and 100 gal. per acre, effectively controlled henbit (*Lamium*

amplexicaule) and chickweed (*Stellaria media*). Duration of control was, however, limited during mild winters when successive populations of these weeds emerged. Similar sprays gave excellent control of the two spotted spider mite, *Tetranychus bimaculatus*, on strawberries [see also *H.A.*, 21: 1500]. Omission of kerosene from the standard mixture had no appreciable effect on the initial kill of red spiders but did give inferior residual action.

3540. ALDRICH, R. J., AND PUFFER, R. E.
Two years results on the use of certain herbicides for weed control in various varieties of strawberries.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 65-8.

Pre-emergence application of 3 lb. per acre of E.H. No. 1 (sodium 2,4-dichlorophenoxyethyl sulphate) gave over 90% control of annual weed emergence for 4 weeks. The strawberries showed no indication of differential varietal response. Typical 2,4-D formative effects following a 1 lb. per acre application of the 2,4-D amine were outgrown. A heavy application of E.H. No. 2 killed off many plants.

3541. HAVIS, J. R., AND MOORE, R. C.
Effect of certain herbicides on the growth of first year strawberry plants.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 69-72, bibl. 4.

Trials in Virginia have shown that 2,4-D treatments stunted the parent plant, reduced runner development, and appeared to inhibit rooting of many runners. E.H. No. 1 appeared to prevent rooting of some of the runner plants, and the general appearance of the plants was slightly less vigorous than that of those in the control plots. IPC applied as a mixture with 2,4-D caused no additional injury. There were no marked differences between the 3 treatments in effectiveness of weed control.

Weed control in turf.

(*See also* 3559j.)

3542. GRIGSBY, B. H.
Control of mossy stonecrop (*Sedum acre* L.) and certain other lawn weeds.
Quart. Bull. Mich. agric. Exp. Stat., 1951, **33**: 326-31, being *Contr. Dep. Bot. and Plant Path.* **51-3.**

The following suggestions are made for weed control in lawns per 1,000 sq. ft.:—¾ oz. of 2,4-D ester in water for mossy stonecrop; ¾ oz. of 2,4-D ester in non-toxic oil for knotweed, chickweed, and mossy stonecrop; 1 gal. of Stoddard Solvent for chickweed, sand bur and annual grasses; ⅔ oz. of dinitrophenol or 6½ oz. pentachlorophenol in water for chickweed; and ½ oz. endoxohexahydrophthallate in water for black medick.

3543. NUTTER, G. C., AND CORNMAN, J. F.
Comparative studies with crabgrass herbicides in turf.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 143-9, bibl. 4.

Of the 10 materials tested at 2 places in New York State, Linck w.p. applied dry with vermiculite, Scutl (both phenyl mercuric acetate formulations—PMA), potassium cyanate and dichloral urea gave the most satisfactory results.

3544. WAYWELL, C. G., AND BIBBEY, R. O.
Potassium cyanate, P.M.A.S. and maleic hydrazide in the control of crabgrass.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 155-60.

1. P.M.A.S. at 3 oz./3 gal./sq. rod gave a good control of crabgrass if more than one treatment was applied. Generally effective treatments yellowed the lawn for a period of time. 2,4-D added to the P.M.A.S. controlled several broad-leaved species. Three treatments of the mixture was hard on the lawn grass. 2. Two treatments with 2 gal. of 0·2% potassium cyanate gave good control of crabgrass with only a minor burn to the lawn grass. At the concentrations used a sticker did not affect the results appreciably. 3. Maleic hydrazide was non-effective for crabgrass control when applied at the pre-heading stage. [Authors' summary.]

3545. ENGEL, R. E., AND ALDRICH, R. J.
Three new compounds for controlling crabgrass in turf.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 151-3.

Monoaminoboronium fluoride (S-1840), Tris (2-hydroxypropylamino) boronium fluoride (S-1980), and Bis (lauryl, di-2-hydroxyethylamino) boronium fluoride (S-1998) were found satisfactory in trials at Rutgers University.

3546. MARTÍNEZ CROVETTO, R.
Las malezas de los céspedes en la capital federal y alrededores. **(Weeds of turf common in the Buenos Aires district.)**
Rev. Invest. agríc. B. Aires, 1950, **4**: 1-45, bibl. 11, illus.

An introduction deals with the origin, distribution and classification of turf weeds, the damage they cause and methods of control practised in the United States. This is followed by a list of 80 important turf weeds found in the district round Buenos Aires, with a description of each and notes on their importance, biological cycle and the methods of control practised locally.

3547. NUTTER, G. C.
Special equipment for the application of herbicides to experimental turf plots.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 167-73, bibl. 2, illus.

An illustrated description is given of a sprayer built at Cornell, which provides for even distribution and precise application of spray materials.

Weed control in vegetable crops.

(*See also* 3510, 3514, 3519, 3559f, n, p, r, s., 3611.)

3548. RAHN, E. M.
Chemical weed control in asparagus seedlings on a commercial scale in 1950.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, p. 95.

A mixture consisting of 9·4% pentachlorophenol in a highly aromatic oil applied pre-emergence at the rate of 5 gal. per acre in 45 gal. of water gave a very

satisfactory control of weeds without injuring the asparagus in Delaware.

3549. Finn, T. P., and King, L. J.
Weed control studies with experimental herbicide 1 at Seabrook Farms, Bridgeton, N.J.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 81-6, bibl. 7.

1. Experimental Herbicide 1 when sprayed on an asparagus planting before, during and after the cutting season controlled weeds effectively without affecting quality or yield of the spears. 2. In plantings of sweet and field corn the best control of weeds was obtained when germination of weeds occurred over a period of several days before Experimental Herbicide 1 and the amine salt of 2,4-D were applied. The 2,4-D amine salt, applied post-emergence at 1 lb./acre of acid produced the typical onion leaf effect on the sweet corn. Experimental Herbicide 1 at 3 lb./acre did not produce such an effect. [Authors' summary.]

3550. Dearborn, C. H.
Effects of weed control sprays of sodium chloride and sodium chloride plus sodium nitrate on the stand and yield of canning beets.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 275-8, bibl. 3, being *J. Pap. N.Y. St. agric. Exp. Stat.* **801.**

The results of 4 trials in 1948 indicate that the canning type of beet grown on heavy soils in Western New York can be weeded with concentrated salt sprays of either sodium chloride or a mixture of sodium chloride and sodium nitrate without impairing the stand or yield of the crop. The salt was applied at the rate of 200 lb. per 100 gal., 200 gal. being applied per acre to the rows. Sensitive weeds, including very young grasses, were killed equally well at pressures of 50 lb. and 100 lb. *Chenopodium album* and *Portulaca oleracea* were resistant. There were no differences in the quality of the canned product from treated and untreated plots.

3551. Hitchcock, A. E., Zimmerman, P. W., and Kirkpatrick, H., Jr.
Chemical weed control in corn, cabbage, tomato, and other crop plants.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 105-8.

One per cent. solutions of monochloroacetic and undecylenic acids killed young weed seedlings without causing adverse residual effects on the crop when the herbicides were applied as pre-emergence and between-row post-emergence sprays. Both herbicides were selective, the degree of selectivity varying with the species of weeds and crop plants. [Authors' summary.]

3552. Jacob, W. C.
Pre-emergence weed control in lima beans and cauliflower.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 109-13, bibl. 3.

Premerge, Dow General and K-1131-Na gave excellent control of weeds for 2 months when applied pre-emergence to lima beans, at rates of 5 to 10 lb. of active material per acre, without injuring the crop. NP-128 at 10 lb. per acre provided satisfactory control for 2 months as pretransplant treatment in cauliflowers.

3553. Antognini, J.
Preliminary results on the use of oils and other chemicals as stem sprays for weed control in onions.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 97-103, bibl. 1, illus.

Agronyl A, Esso 45, Varsol 2, gasolene and NIX were highly effective against common weeds in onions, particularly from the middle of the season until it was no longer feasible to go through the crops. Agronyl A exhibited a marked residual effect and, in addition to controlling weeds at the time of application, inhibited weed growth for 2 to 3 weeks after the last spraying, which should enable the onions to be harvested and the field to be disked before the weeds produce viable seeds. For late applications, however, it will still have to be determined whether the chemicals used as stem sprays affect the storage quality of the onions.

3554. Lachman, W. H.
Weed control in set onions and sweet corn.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 131-6.

Nineteen treatments each were applied to plots of Golden Jewel sweet corn and Ebenezer onions at the Massachusetts Agricultural Experiment Station. Onions appeared to be more susceptible to injury by dinitro compounds than corn. Sodium pentachlorophenate, at the rates of 20 and 30 lb. per acre, was perhaps the most effective material used, and Experimental Herbicide No. 1 the least satisfactory.

3555. Hernandez, T. P., and Warren, G. F.
A comparison of 2,4-D pre-emergence treatments on onions on two soils.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 283-6, bibl. 4.

A field comparison of injury to onions from sets and seeds was made on peat and silt loam soil located less than ¼ mile apart. There was no reduction in yield due to 2,4-D pre-emergence treatments on the peat soil. In the silt loam soil, however, the onions from seeds were almost all killed and those from sets were severely injured, apparently due to the more rapid leaching of 2,4-D to the onion root zone. The pre-emergence treatments applied immediately after the onions were planted on the silt loam soil gave poorer weed control than the ones applied 5 days later. In the time between the first and second pre-emergence treatments there were 1·89 inches of rainfall which apparently leached the 2,4-D into the soil, therefore reducing its toxicity in the upper layer of soil. On the peat soil there was little difference in weed control between the first and second pre-emergence treatments. [Authors' summary.]—Dep. Hort. Wisconsin.

3556. Hahn, P.
Calcium cyanamide for pre-emergence weed control and fertilization in canning peas, New York State, 1950.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 119-23, bibl. 5.

Calcium cyanamide applied broadcast at the rate of 200 to 400 lb. per acre 10 days after seeding resulted in higher yields and better quality peas and very satisfactory weed control. Plots in a high state of fertility benefited from the treatment considerably more than others.

3557. Ellison, J. H., and Jacob, W. C.
A comparison of cultivation with chemical weed control in potatoes.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 139-42.
In further trials [see *H.A.*, 21: 1590] 4 herbicides at 3 rates each were tested as pre-emergence sprays on irrigated and unirrigated land. Under irrigation the order of effectiveness was Premerge, T.A.C., Experimental Herbicide No. 2 and E.H. No. 1. No difference was found among the same chemicals on unirrigated plots. Cultivation increased yields on both the irrigated and unirrigated land most significantly where normal cultivation or hand hoeing was practised without chemical treatment, and somewhat less, but still markedly, where late cultivation followed the pre-emergence application. A close correlation was found between weed control and yield.

3558. Noll, C. J., and Odland, M. L.
Pre-emergence weeding of spinach with chemical herbicides.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 115-17, bibl. 2.
Of the 11 chemicals tested at the Pennsylvania State College, none resulted in increased yield in spinach. Shell oil 130 at 15 gal. per acre and Experimental Herbicide No. 2 at 7 lb. per acre on plots sown at the normal time, and 5 chemicals on late sown plots resulted in as good a yield as the untreated crop with a significant increase in weed control.

Noted.

3559.

a Anon.
Control of Johnson grass with sodium TCA.
Down to Earth, 1950, **6**: 2: 8-9, illus.
Results and recommendations from Arizona and California.

b Beatty, R. H., and Davis, B. H.
Factors altering the effectiveness of potassium cyanate for crabgrass control.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 161-4, bibl. 3.

c Beatty, R. H.
Possibilities of dormant basal sprays.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 71-2.

d Carlson, R. F., Moulton, J. E., and Krone, P. R.
Further developments in gladiolus weed control.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 77-80, bibl. 3.
See *H.A.*, 21: 2563.

e Carlson, R. F., and Moulton, J. E.
Further testing of herbicides in strawberry plantings.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 47-51, bibl. 9.
See *H.A.*, 21: 2565.

f Cobb, J. S.
Some variations in weed control on potatoes.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, p. 137.

g Dallyn, S. L., and Sweet, R. D.
Theories on the herbicidal action of petroleum herbicides.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 13-17, bibl. 3.
Summary and discussion of a paper to be published.

h DeRose, H. R.
Crabgrass inhibition with O-isopropyl N-(3-chlorophenyl) carbamate.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, p. 183.
See *H.A.*, 21: 2550.

i Everist, S. L.
Hoary cress—declared a noxious weed.
Qd agric. J., 1951, **72**: 19-21, illus.
The plant and its control by hormone weedkillers.

j Grau, F. V.
Weed control in turf without chemicals.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 181-2.

k Hanf, M.
Symptome der Schädigungen durch 2,4D-Mittel. **(Symptoms of injuries caused by 2,4-D preparations.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 36-40, illus.

l Henriet, J.
Contribution à l'analyse des produits phytopharmaceutiques. Produits herbicides à base de chlorate de soude. **(A contribution to the analysis of chemical control substances. Sodium chlorate herbicides.)** [Summaries in Dutch, German and English, ½ p. each.] *Bull. Inst. agron. Gembloux*, 1950, **18**: 3/4: 47-54, bibl. 2.

m Kramer, M.
Velhos e novos métodos de combate às ervas daninhas. **(Old and new methods of weed control.)**
Biológico, 1950, **16**: 5-14.

n Lachman, W. H.
Weeding [sweet] corn with chemicals. II.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 279-82, bibl. 8.
For abstract of this published elsewhere, see *H.A.*, 21: 1593.

o Laning, E. R., Jr., and Aldrich, R. J.
Increasing the effectiveness of herbicides by the addition of wetting agents.
Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 175-80.

p Leefe, J. S.
Weed control in peas in Nova Scotia.
Down to Earth, 1951, **7**: 1: 12, illus.

q Minarik, C. E.
Pre-emergence herbicides and their behavior.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 29-39, bibl. 34.

r STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Ukrudtsbekaempelse i kepalog (zittauerløg) og porrer. **(Weed control in onions and leeks.)**
Ukrudtsbekaempelse i gulerødder, selleri m.fl. **(Weed control in carrots and celery.)**
Tidsskr. Planteavl, 1950, **54**: 176-7 and 177-80, being *Medd. Stat. Forsøgsvirks. Plantekult.* **450** and **451.**

s SWEET, R. D.
Limitations of pre-emergence. Summary.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 47-9.

t WARREN, G. F.
Crop reactions to pre-emergence herbicides.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 41-5, bibl. 8.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 3159, 3160, 3161, 3173, 3187, 3188, 3204, 3205, 3211, 3218, 3228y, 3239, 3359, 3463, 3672, 3674c, j, p, v, 3719, 3942, 3969, 4090 and annual report section.)

3560. CHILDERS, N. F., AND OTHERS.
Vegetable gardening in the tropics.
Circ. Fed. Exp. Stat. Puerto Rico **32,** 1950, pp. 144, bibl. 125, illus.
The information given in this excellent and much needed circular is based on more than 45 years' experience with vegetables at the Federal Experiment Station, Mayagüez, as well as on the authors' observations in the American Tropics, on a series of trials at 3 altitudes in Puerto Rico, and on the literature from other tropical institutions. It is claimed that almost any vegetable that can be grown in the temperate zone can also be grown in the tropics, provided the proper variety, season, altitude and soil conditions are selected, but the need for a co-ordinated breeding programme is stressed. An introductory section on the effect of tropical climatic conditions on the growth of vegetables includes a table showing the temperature range over which certain vegetables can be grown most successfully, while the section on general gardening suggestions includes a list of vegetable varieties likely to succeed in the tropics, and plans for small, medium and large gardens at different altitudes and mean temperature levels. The culture of 46 individual crops is then dealt with in some detail, and the possibilities and problems of commercial vegetable growing and hydroponics are discussed. Finally 40 pages are devoted to disease and insect control.

3561. ANON.
Voedingsgewassen; groenten. **(Food crops [of Suriname]; vegetables.)**
Nickeriaan, 26 Aug. 1950, p. 7, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 655.
The species are listed under: (1) cultivated vegetables sold in the market, (2) wild vegetables sold in the market, and (3) vegetables mainly eaten by the Javanese and not grown commercially.

3562. ODLAND, M. L., AND NOLL, C. J.
Vegetable variety trials—1950.
Progr. Rep. Pa agric. Exp. Stat. **42,** 1951, pp. 12, illus.
The results are tabulated of variety trials with peas, lima beans, cauliflowers, eggplants, snap beans, broccoli, tomatoes, sweet corn and celery.

3563. BUREAU OF AGRICULTURAL ECONOMICS, U.S. DEPARTMENT OF AGRICULTURE.
I. Acreage of vegetable seeds harvested. II. Vegetable seed production.
Seed Trade Buyers' Guide, 1951, **34**: 247, 248.
The acreage and the weight of seeds harvested in the U.S.A. from 46 kinds of vegetable are tabulated by the Division of Field Crop Statistics, Bureau of Agricultural Economics, for the years 1945-1950. The figures range from about 306,000 acres in 1946 producing about 271,000,000 lb. seed, to 186,000 acres in 1948 producing 181,000,000 lb.

3564. ANON.
Vegetable seed germination standards.
Seed Trade Buyers' Guide, 1951, **34**: 24-5.
The minimum germination percentage required by each State in the U.S.A. is tabulated for 62 vegetables.

3565. VARMA, S. R.
Trials on the production of the European type of biennial vegetable seeds in the hills for the years 1948-1949.
Indian J. Hort., 1951, **8**: 1: 18-19, illus.
Twelve out of 13 varieties of brassicas and root vegetables (beet, carrot, turnip and radish) produced seed crops when mature plants were transferred in early March from Motibagh, Patalia, to plots situated at 6,000 to 9,000 feet, the only failure being the late cauliflower, Patna Late. The brassicas were transplanted with a ball of earth and the root crops with tops and roots trimmed back. Later transplanting in April of the previous year had been unsuccessful owing to excessive cloud and rain at the time the seed should have matured. Another method under trial is outlined.

3566. ČERNENKO, E. S.
The germination of seeds of varieties with different ripening periods. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 1085-8, bibl. 2.
Germination tests were carried out with seeds of late and of early varieties of cabbage, cucumber, peas, carrot, tomato, maize, wheat and barley. There was a general agreement in the results. The energy of germination of early varieties was higher than that of late varieties; radicles and young shoots grew more quickly and the root hairs appeared sooner.

3567. STARNES, O., AND REED, J. P.
Vegetable insects and their control on commercial plantings.
Bull. N.J. agric. Exp. Stat. **756,** 1951, pp. 16.

Control measures against vegetable insects are discussed under: machine adjustment, spray and dust applications, fumigants for soil pest control, insecticides, insecticide formulas, mixing dusts on the farm, and an insect control chart, showing crop and insect, kind of injury, description of injurious stage of insect, and control or prevention.

3568. Bronson, T. E., and Rust, R. E.
Mist sprays for control of certain truck crop insects.
J. econ. Ent., 1951, **44**: 218-20, bibl. 1, illus.
A report on results obtained in a 3-year trial on insecticides, mainly DDT, applied by mist blowers to potato, cabbage and onion pests.

3569. Christie, J. R., and Perry, V. G.
A root disease of plants caused by a nematode of the genus *Trichodorus*.
Science, 1951, **113**: 491-3, bibl. 3, illus.
A species of *Trichodorus* has been found to cause serious injury to several vegetable crops in Florida, an inoculation test confirming its responsibility for damage done to beetroot and sweet corn. Abnormalities of root growth are described and the names "stubby-root" and "stubby-root nematode" are suggested for the disease and causal organism respectively. It seems probable that damage done to seedlings may be responsible for much pre-emergence damping-off.

3570. Georlette, R.
La lutte contre les taupins. **(Control of wireworms.)**
Ann. Gembl., 1950, **56**: 231-4, bibl. 56.
A selected bibliography on the biology of wireworms, the damage they cause and modern methods of control.

Brassicas.

(*See also* 3674a, b, w.)

3571. Eide, P. M., and Stitt, L. L.
Comparisons of insecticides for cabbage maggot control.
J. econ. Ent., 1950, **43**: 899-905, being *Sci. Pap. Wash. St. agric. Exp. Stats* **954.**
In tests in Washington State, chlordane, BHC, lindane, aldrin, and dieldrin all gave good control of the cabbage maggot, *Hylemya brassicae*, on broccoli, cauliflower, and seed cabbage. Parathion gave good control in some tests, but failed in others. Toxaphene was less effective and caused some stunting of plants. Ditolyl trichloroethane, methoxychlor, and DDT were unsatisfactory when used as 5% dusts, but the last two showed promise in one trial when used at 50% strength. Of several methods of application used the dipping method was by far the cheapest, though not the most effective.

3572. Bakker, M.
Bacterievlekkenziekte in bloemkool en andere koolsoorten, veroorzaakt door *Pseudomonas maculicola* (McCulloch) Stevens. **(Bacterial spot of cauliflower and other brassicas caused by *Pseudomonas maculicola*.)** [English summary ¾ p.]
Tijdschr. PlZiekt., 1951, **57**: 75-81, bibl. 22, illus.
During the rainy summer of 1950 in the Netherlands, bacterial spot caused by *Pseudomonas maculicola* seriously affected cauliflower and less severely other *Brassica* spp. The disease is characterized by an abundant stomatal blotching of the leaves. The spots are at first water-soaked; the centre becomes necrotic, dark brown and after a few days brownish grey with a dark border, 1-3 mm. in diameter. They are circular when small but later become angular and coalesce. Unless this disease becomes more serious, however, control measures will be unnecessary.

3573. Plant, W.
Some relationships between molybdenum, nitrate and ascorbic acid levels in cauliflower plants and the incidence of whiptail symptoms.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 91-5, bibl. 6.
The trial was laid out on newly ploughed permanent pasture at a centre in Wiltshire on the Lower Greensand (pH 5·2) where whiptail in cauliflower had previously been confirmed. Treatments consisted of applications of ground limestone, and various combinations of sodium molybdate and gypsum, separately and together. Molybdenum deficiency occurring on the control and gypsum plots was characterized by chlorosis, malformation of lamina and blindness. Whiptail occurred only on the control (24%) and the gypsum treated plot (79%). Ground limestone gave no better results than 2 lb. sodium molybdate per acre. Chlorotic leaves from whiptail plants contained significantly less ascorbic acid and molybdenum and significantly more nitrate than others.

3574. Hewitt, E. J., and Agarwala, S. C.
Production of "whiptail" in cauliflower grown in sand culture.
Nature, 1951, **167**: 733, bibl. 7, illus.
The authors have now found the main conditions under which all the characteristic "whiptail" symptoms of cauliflower may be produced at will in sand culture. They are an abundant supply of nitrogen (350 p.p.m. nitrogen (25 m. eq./l.nitrate)) and a carefully controlled low level of molybdenum (0·00005 p.p.m.), given regularly in the solution from sowing.

3575. Agarwala, S. C.
The effect of molybdenum and nitrate status on yield and ascorbic acid content of cauliflower plants in sand culture.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 83-90, bibl. 15.
The author summarizes in this paper the yield and ascorbic and dehydroascorbic acid concentrations resulting from different treatments given. Growth in cauliflower was increased by molybdenum up to 0·0005 p.p.m. in the presence of limited nitrate, but the effect of molybdenum persisted up to 5 p.p.m. and above with a high concentration of nitrate. When molybdenum was reduced below ·0005 p.p.m. the concentration of ascorbic acid in the plant fell. It was also depressed by high nitrate status.

3576. Roy, R. S., and Choudhury, B.
Effect of fertilizers on the yield of cauliflower (*Brassica oleracea*).
Indian J. Hort., 1950, **7**: 3/4: 1-6, bibl. 10.
Three levels of NPK were applied in two successive

years to cauliflowers planted out two weeks earlier on a fine loamy soil at Sabour, Bihar. In both years a medium dressing of 80-60-80 lb. per acre gave the highest yield. In the first year this dressing also produced the highest profit, but in the second the profit was slightly, though not significantly, less than that obtained with a 60-40-60 lb. dressing. In both years higher dressings of 160-120-160 lb. and 100-80-100 lb. respectively depressed the yield as compared with the medium dressing.

Celery.

(*See also* 3674t.)

3577. Hahmann, K., and Müller, H. W. K.
Zur Herzfäule des Selleries. **(Heart rot of celeriac.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1951, **3**: 49-51, bibl. 3, illus.

Heart rot and wilting, malformation of leaves and stems, and change in the tuber tissue, symptoms similar to those of boron deficiency, observed in late summer, 1950, on celeriac grown in the Hamburg district, are ascribed mainly to *Lygus campestris* infestation. Spray applications of contact insecticides 0·03% E.605 f., 2% Gesarol or BHC gave an immediate control of the bugs and improved the storage quality of the vegetable.

3578. Smith, M. A., and Ramsey, G. B.
Brown spot disease of celery.
Bot. Gaz., 1951, **112**: 393-400, bibl. 16, illus.

A species of the fungus *Cephalosporium*, for which the name *C. apii* is proposed, was found to cause brown lesions on the inside and outside of leaf stalks, on leaflets and on petioles of *Apium graveolens*. The spots often coalesced to form extensive brown areas. The disease was confined primarily to epidermal cells. Inoculation of celery plants produced the disease in typical form, but other umbelliferous plants were not susceptible. The organism was readily cultured on potato or celery-dextrose agars and on cooked celery stalks. The optimum temperature for growth was 75° F. Bordeaux mixture inhibited spore germination. Wettable sulphur was less effective. C.W.S.H.

Cucumbers.

(*See also* 3194, 3674x.)

3579. Bell, T. A., Etchells, J. L., and Jones, I. D.
Pectinesterase in the cucumber.
Arch. Biochem., 1951, **31**: 431-41, bibl. 18, being *Pap. J. Ser. N.C. agric. Exp. Stat.* **351.**

The seeds, leaves, petioles, stems, flowers, and fruit of the pickling cucumber (*Cucumis sativus*) were found to contain the deesterifying pectic enzyme, pectinesterase. The optimum for activity of this enzyme (pH, 7·5, and NaCl, 0·15–0·20 *M*) was very similar to that reported for orange flavedo and tomato esterase. The rate of development of the enzyme in the cucumber and tomato (*Lycopersicon esculentum*) was found to be different. In the cucumber, the esterase content remains fairly constant throughout fruit development, but in the tomato the enzyme content increases very rapidly to over 300 times its initial amount. [From authors' summary.]

3580. Davies, J. N., and Owen, O.
Soil sterilization. I.—Ammonia and nitrate production in some glasshouse soils following steam sterilization.
J. Sci. Food Agric., 1951, **2**: 268-79, bibl. 10.

While the work reported in this paper is primarily of interest to soil scientists, it is noted that the high ammonia concentrations induced by steaming were not toxic to young cucumber and tomato plants.

3581. Kosswig, W.
Untersuchungen über die durch *Fusarium* spec. an Gurke (*Cucumis sativus* L.) hervorgerufene Welke. **(On the fusarium wilt of cucumber.)**
Phytopath. Z., 1951, **17**: 410-20, bibl. 18.

A comparison of the pathogenicity to cucumber of species of *Fusarium* of the *elegans* and *martiella* groups. In general the former are more pathogenic than the latter.

3582. Barnes, W. C., and Epps, W. M.
Some factors related to the expression of resistance of cucumbers to downy mildew.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 377-80, bibl. 4, being *Tech. Contr. S.C. agric. Exp. Stat.* **171.**

Observations have been made over the past 10 years at Charleston, S.C., on the following factors related to the expression of resistance in cucumbers to downy mildew: the physiological age of the plants, the abundance of inoculum, weather conditions, and the effect of fungicides.

Legumes.

(*See also* 3171, 3172, 3174, 3190, 3191, 3207, 3674d, h, i, l, n, s.)

3583. Ministry of Agriculture, London.
Beans.
Bull. Minist. Agric. Lond. **87**, 2nd edition, 1950, pp. 35, illus., 2s.

This bulletin deals separately with the cultivation of the three main types of culinary bean grown commercially in England: the broad bean, the French bean and the runner bean. Beans grown for stock-feeding are not included. Since the first edition in 1935, the material has been considerably revised and rearranged. The somewhat complicated section on varieties of French beans, for instance, has been simplified by the omission of the stringless and waxpod varieties, which are little grown in this country, and by the transfer of information on climbing varieties to the section headed " French beans under glass ". The section on beans for canning and harvesting dry contains more specific information on cultivation and harvesting than in the previous edition, while that on pests and diseases has been extended to include notes on the bean seed fly, red spider mite, sclerotinia disease of broad beans and mosaic of dwarf beans. DDT dusts are now recommended for control of pea and bean weevils. A useful appendix has been added on local practices in runner bean production in Worcestershire, one of the largest producing areas. It is interesting to note that in the

Bromsgrove district the seed is sown by being pushed into the ground with the fingers. The 2 new plates, showing Worcestershire methods of staking and irrigation, are not very clear.

3584. Casseres, E. H., and Thompson, H. C.
Snap bean variety tests at Turrialba, Costa Rica.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 349-52.

The local variety Jamaica significantly outyielded 5 imported U.S. snap bean varieties of superior quality in several trials, but some of the latter, notably Tendergreen, Florida Belle and Sure Crop, did sufficiently well to merit cultivation under tropical conditions. The best average yields occurred when the rainfall ranged from 2 to 6 in. per month. Beetles of several *Diabrotica* spp. were effectively controlled with BHC without impairing the flavour.

3585. Dupouy, L.
Les pois de conserve en Finistère et Morbihan. **(Canning peas in Finistère and Morbihan.)**
Rev. hort. Paris, 1951, **123**: 492-3.

In these 2 districts of Brittany, 11,000 ha. are devoted to the production of peas for canning. Brief notes are given on varieties grown, methods of culture and harvesting.

3586. Lynch, L. J., and Mitchell, R. S.
Physical measurement of quality in canning peas.
Bull. Coun. Sci. Industr. Res., Aust. **254**, 1950, pp. 35, bibl. 31, illus.

The need for a rapid, objective means of maturity assessment for canning peas is demonstrated. The percentage of alcohol-insoluble solids was confirmed as a suitable maturity standard, and a hand-operated, portable maturometer was developed which has been shown to give reliable performance in terms of alcohol-insoluble solids, and tendrometer and organoleptic determinations.

3587. Fedorov, M. V., and Podjapoljskaja, V. P.
The effect of ensuring sufficient phosphorus and potassium on the formation of nodules and on yield in leguminous plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 1081-4, bibl. 8.

Peas were grown in sand cultures with normal and with reduced amounts of phosphorus and potassium. Reducing phosphorus had a favourable effect on yield and had little effect on the weight of the nodules. Reducing the potassium reduced yields and also lowered the weight of the nodules formed.

3588. Wynd, F. L., and Stromme, E. R.
Absorption of manganese and iron by navy bean plants grown in a calcareous soil fertilized with a manganese-containing glassy frit.
Lloydia, 1951, **14**: 40-54, bibl. 15.

A manganese-deficient, calcareous soil was treated with 50 lb. per 10 sq. ft. of powdered frit, containing 4·8% MnO_2 and other trace elements, or with 200 lb. manganese sulphate per acre or with no Mn. The frit was mixed with the top 8 in. of soil. Navy beans, variety Robust, were sown shortly afterwards. The frit increased the dry weight of the plants about 100% and the yield of seed 43%. Manganese sulphate increased the dry weight about 200% and the yield of seed about 215%. Chemical analyses of stems and seeds showed that both treatments significantly increased the Mn content, but the frit produced a more marked lowering of the Fe content than did the manganese sulphate. The optimum ratio of concentration of Fe to Mn in the stems was about 16·0.

3589. Guyer, R. B., Kramer, A., and Ide, L. E.
Factors affecting yield and quality measurements of raw and canned green and wax beans—a preliminary report.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 303-14, bibl. 15, being *Sci. Publ. Md agric. Exp. Stat.* **A275.**

Two varieties of snap [string] bean were harvested on 5 dates and at 4 frequencies and were subjected to detailed organoleptic and objective tests both at the time of harvest and after being stored for 1, 4, 7 or 10 days at 35, 50 or 70° F. The various tests are described and their relative value discussed. With later harvesting the seed, fibre and ascorbic acid contents of the pods increased and the moisture content and concentrations of green and yellow pigments decreased. Storage up to 10 days at the 3 temperatures had little effect on seed, fibre or moisture contents, but caused a reduction in ascorbic acid content, in the concentrations of green and yellow pigments, and in quality as determined by organoleptic tests. Preliminary data, based on one year's results, showed that harvesting beans twice, at an early stage of maturity, produced good yields and good quality; harvesting the whole crop in one operation gave high yields but only at a great sacrifice in quality, while harvesting more than twice was of doubtful economic value.

3590. Wade, G. C.
Pea diseases in Tasmania.
Tasm. J. Agric., 1951, **22**: 40-8, bibl. 1, illus.

The diseases described are mycosphaerella blight (*M. pinodes*), ascochyta leaf and pod spot, septoria leaf spot, fusarium root and collar rot, aphanomyces root rot, stem rot caused by *Sclerotinia sclerotiorum*, damping-off (*Pythium* spp.), downy mildew, powdery mildew, bacterial blight (*Pseudomonas pisi*), common pea mosaic, " pimple pod " virosis, and non-parasitic disorders (lack of nodulation, molybdenum deficiency and frost injury).

3591. Quantz, L.
Eine Virose der Erbse und anderer Leguminosen. **(A virus disease of peas and other leguminous plants.)**
Phytopath. Z., 1951, **17**: 472-7, bibl. 12, illus.

A disease observed in Germany in 1950 causing distortion of leaves and fruits, particularly on field and garden peas but seen also on sweet peas (*Lathyrus odoratus*) and *Trifolium incarnatum*, is attributed to infection by the enation virus, *Pisum virus* 1. The leguminous host plants of this virus, as mentioned by various observers, are reviewed.

3592. QUANTZ, L.
Untersuchungen über Viruskrankheiten an Buschbohnen. **(Virus diseases of French beans.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 74-9, bibl. 4, illus.
Virus infection of French beans is widespread in Germany. In addition to the common bean mosaic (*Phaseolus virus* 1) it is here recorded that yellow bean mosaic (*Phaseolus virus* 2) also occurs. The distinguishing characters of the two viruses are set out, particularly with reference to host range.

3593. BRONSON, T. E., AND DUDLEY, J. E., Jr.
Pea aphid control with sprays applied by a mist blower.
J. econ. Ent., 1950, **43**: 954-5, illus.
Of 3 insecticides giving good control parathion proved the most effective, but DDT did less injury to the crop than parathion or TEPP.

3594. WRIGHT, D. W., GEERING, Q. A., AND DUNN, J. A.
Varietal differences in the susceptibility of peas to attack by the pea moth, *Laspeyresia nigricana* (Steph.).
Bull. ent. Res., 1951, **41**: 663-77, bibl. 4.
The changes in the active moth population during the flight period of the pea moth were estimated and the varieties were compared in relation to the proportion of this population to which each had been exposed. There was a strong positive correlation between the degree of exposure and the incidence of attack on the different varieties. Statistical analyses showed that the two factors, exposure and plant cover [i.e. area of foliage per unit length of row], were closely associated and exerted a joint influence on subsequent attack.—School of Agriculture, Cambridge.

3595. SPEYER, W.
Beitrag zur Bekämpfung des Erbsenwicklers (*Laspeyresia nigricana* Steph.). **(The control of the pea moth.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1951, **3**: 38-40, bibl. 6.
Observations made at Kitzeberg near Kiel have shown dwarf pea varieties to be less often attacked by the pea moth than tall varieties, that the time of sowing does not influence the intensity of the infestation, and that the contact insecticides Nexen, Gesarol, Gesapon and E.605 forte, applied after the beginning of blossoming, give promising control of the moth.

3596. LANGE, W. H., Jr., CARLSON, E. C., AND CORRIN, W. R.
Seed treatments for control of the seed-corn maggot in Northern California.
J. econ. Ent., 1951, **44**: 202-8, bibl. 6.
For the commercial control of the seed-corn maggot, *Hylemya cilicrura*, in large lima beans, 0·33 oz. of 75% lindane (1 oz. of 25%) applied as dust or as slurry, per 100 lb. of seed, together with a suitable fungicide such as Spergon or Arasan, was found effective. The treatment also controlled wireworms.

3597. HUCKETT, H. C.
Tests of acaricides for control of the two-spotted spider mite on lima beans on Long Island.
J. econ. Ent., 1951, **44**: 192-6, bibl. 2.
The most effective sprays for mite control were those containing the systemic compound E-1059, suspensions of EPN 300 and of methyl ethyl sulphite. There were also large reductions of injured pods in plots treated with a suspension of parathion at a high dosage strength, with parathion and dialkyl nitroaryl thiophosphates as emulsions, with the systemic octamethyl pyrophosphoramide, and with parathion and chlorophenyl chlorobenzene sulphone dusts.

3598. WALLACE, P. P.
Octamethylpyrophosphoramide.
J. econ. Ent., 1951, **44**: 224-8, bibl. 7.
In controlled trials water solutions of octamethylpyrophosphoramide were readily taken up through cut stems of beans, and the chemical became established in the foliage where it was toxic to two-spotted spider mites, *Tetranychus bimaculatus*, feeding thereon. This was the most efficient method of application, others being foliage and soil treatments.

3599. SPEYER, [W.].
Biologie und Bekämpfung des Pferdebohnenkäfers (*Bruchus rufimanus*). **(Biology and control of the broad-bean beetle.)**
Mitt. biol. Zentralanst, Berlin-Dahlem, Hft **70**, 1951, pp. 122-6.
The life-history of the bean beetle is described and recommendations are given for its control in the garden and in the field. For garden applications the advice is (1) dusting before blooming with a phosphoric acid ester, (2) spraying after blossoming with a 0·05% phosphoric acid ester preparation at weekly intervals.

3600. MIDDLEKAUFF, W. W.
Field studies on the bionomics and control of the broad bean weevil.
J. econ. Ent., 1951, **44**: 240-3, bibl. 2.
One well timed, thorough application of 5% DDT to all bean fields in an area in California appeared to control *Bruchus rufimanus*. DDD and dieldrin showed promise and deserve further observation.

3601. WESTER, R. E.
A comparison of greenhouse and field methods for evaluating lima beans for resistance to root knot nematodes.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 395-400, bibl. 3.
1. The controlled greenhouse method reported in this paper for testing lima bean plants for nematode resistance is much more rapid and severe than field tests. 2. A higher root knot index on lima bean roots was obtained at a soil temperature of 90° F. in the greenhouse within a shorter time and with a lower number of added egg masses than in the field. 3. Large numbers of lima bean stocks and breeding lines can be tested for relative root knot resistance by the greenhouse method. [Author's summary.]

Melons, cantaloupes, etc.

3602. CRITTENDEN, H. W.
Root-knot nematode control on cantaloupes.
Abstr. in *Phytopathology*, 1951, **41**: 560.
Iscobrome D (23% ethylene dibromide) at 29 gal./acre and D-D at 21 gal./acre, applied as soil treatments in autumn, were equally effective.

3603. Ivanov, V. V.
Is the melon poisonous ? [Russian.]
Priroda, 1951, **40**: 3: 60-1, bibl. 4.
Records are quoted in which the toxicity of melon fruits is mentioned. The symptoms of melon poisoning are described, with brief remarks on medicinal properties.

3604. Beattie, J. H., and Doolittle, S. P.
Muskmelons.
Fmrs' Bull. U.S. Dep. Agric. **1468**, revised 1951, pp. 38, illus.
Musk melons are produced as a commercial crop in 26 of the United States, especially favourable conditions being found in the Imperial Valley of California and the Rocky Ford district of Colorado. The poor quality of many commercial musk melons, particularly those produced in humid districts, is due mainly to disease and premature harvesting. Special attention is paid to these two points in this general account of musk melon production in the United States.

3605. Anon.
Fusarium wilt of watermelons.
Agric. Gaz. N.S.W., 1951, **62**: 200-1.
Fusarium wilt (*Fusarium oxysporum* f. *niveum*) is one of the most important and widespread diseases of watermelons in New South Wales. It is confined to watermelons, and other cucurbits are not attacked by it. The most satisfactory method of control is planting resistant varieties, e.g. Hawksbury Wilt Resistant and Blacklee.

3606. Runov, V. I., and Ėĭdeljnant, N. M.
The effect of calcium on the structure of leaves and the physiological processes in melons. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 397-9, bibl. 7.
Spraying melon plants with a 3% solution of $Ca(NO_3)_2$ not only altered the appearance of the plants but caused a change in the internal biochemical processes which increased yield and induced resistance to wilt disease.

3607. Volosky Y., E.
Tres nuevas variedades de hortalizas para Chile. **(Three new vegetable varieties for Chile.)** [English summary ½ p.]
Agric. téc. Chile, 1950, **10**: 43-53, bibl. 7, illus.
One of the main problems of water melon production in Chile is variability of fruit form and quality, due to hybridization. As a result of a breeding programme carried out by the Department of Agricultural Research, Ministry of Agriculture, Chile, an inbred strain of water melon, known as Chilena No. 1, was produced. The plant is vigorous and yields well, the fruit is medium to large in size, dark green with red flesh, and travels well. Excellent strains of capsicum have also been selected from the varieties Cristal and Nora de Murcia.

Mushrooms.

3608. Lambert, E. B., and Ayers, T. T.
A two-phase system of pasteurizing for mushroom culture.
Abstr. in *Phytopathology*, 1951, **41**: 563.
To ensure effective eradication of harmful organisms from mushroom beds a pasteurizing procedure has been developed consisting of a short, high temperature fermentation followed by a lower temperature to recondition the compost. The beds are loosely filled and the air temperature surrounding them is raised to approximately 150° F., with the compost 5° to 15° higher. After about 6 hours of this "peak heat", the bed temperature is reduced to approximately 115° with a minimum air temperature of 105°. The beds are usually held at this temperature for 3 days after ammonification has ceased, or about 7 days in all.

3609. Hopf, P. P., Lhoste, J., and Ravault, L.
A new mercurial with apparent systemic properties as a seed dressing.
J. Sci. Food Agric., 1951, **2**: 295-302, bibl. 10, illus.
Phenyl mercuric dinaphthylmethanedisulphonate was investigated for its use as a seed disinfectant for cereals. Various compounds of this mercurial applied to mushroom beds, at the rate of 50 p.p.m. dissolved in water, gave improved crop yields.

Onions and similar plants.

(*See also* 3674m, u, y.)

3610. Norris, W. E., Jr.
Studies of onion root respiration. V. Effect of culturing temperature and seed sample on root respiration and diameter. [French and German summaries ½ p. each.]
Biochim. biophys. Acta, 1951, **7**: 225-37, bibl. 17.
Onion roots from 2 different lots of sets were grown in nutrient solution at 20, 25 or 30° C. Gas exchange measurements were then made on segments of the roots at 30° C. Roots cultured at the higher temperatures showed a decrease in the rate of oxygen consumption and an even greater decrease in carbon dioxide production as compared with those cultured at 20° C. The most marked changes were shown by meristematic tissue. The diameter of the roots produced at the 3 temperatures was not significantly different for any one lot of sets, but the diameter of the roots produced by the different lots of sets was markedly different. It is therefore concluded that measurements of gas exchange should be reported per unit weight of tissue rather than per root, and that in any one series of respiration investigations onion sets from the same lot should be used, and the roots cultured at constant temperature.—Bryn Mawr Coll., Pa.

3611. Isenberg, F. M. R., and others.
The effect of maleic hydrazide on certain dehydrogenases in tissues of onion plants.
Science, 1951, **113**: 58-60, bibl. 4, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1602**.
Onion plants with shoots about 3 in. high, some kept in full sunlight in a greenhouse and others in total darkness, were sprayed with maleic hydrazide at concentrations equivalent to 0, 1,000, 2,000, and 3,000 p.p.m. on 3 successive days. Estimations of the quantities of triphenylformazan produced at different periods after treatment indicated that the maleic hydrazide affected respiration through the partial inactivation of one or more of the dehydrogenases.

The rapidity of its effects is apparently governed by the rate of its absorption into the plant.

3612. Pečenicina, A. M.
The part played by carbohydrates in the conversion of nitrogenous substances in the higher plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 597-600, bibl. 4.
When onion bulbs and potato tubers are grown in darkness in a mineral solution, nitrogen compounds of a non-protein character, in particular amides, are produced. In a quantitative determination of the carbohydrates and nitrogen compounds it is found that the carbon base of those compounds is derived from the carbohydrates or the products of their disintegration.

3613. Service de la Protection des Végétaux, Strasbourg.
Une grave maladie de l'oignon: la bigarrure jaune. (**A serious disease of onions: yellow mottling.**)
A leaflet reprinted in *Progr. agric. vitic.*, 1951, **136**: 71-3.
A disease of onions in the east of France is characterized by the leaves breaking, and collapsing from the middle upward, and by a striping, with alternate green and yellowish-green bands, on the flower stem. The disease is caused by a virus, but the seeds do not become infected, and viable seeds produce healthy plants.

3614. Rawlins, W. A., and Newhall, A. G.
An improved method of applying insecticides for onion maggot control.
J. econ. Ent., 1950, **43**: 950-1.
The addition of dieldrin wettable powder to a fungicide applied as a dust in the seed furrow at sowing appeared to be a promising method of single-application control of the onion maggot, *Hylemia antiqua*.

3615. Mayeux, H. S., and Wene, G. P.
Control of onion thrips with low volume sprays.
J. econ. Ent., 1950, **43**: 908-12, bibl. 8.
The data show that low-volume sprays applied by either ground or air equipment were just as effective as dusts in the control of onion thrips. Data also show effective thrips control when low-volume sprays were applied during windy weather with ground sprayers. Low-volume sprays of DDT, toxaphene, heptachlor, aldrin, dieldrin, chlordane, methoxychlor and gamma benzene hexachloride gave effective control of onion thrips. [Authors' summary.]

Root vegetables.

(*See also* 3212, 3213, 3674g, 4122.)

3616. Hayter, C. N.
Beetroot and boron deficiency.
Rhod. agric. J., 1950, **47**: 482-5, bibl. 6, illus.
Stunted growth with leaves turning yellowish-green when plants are about 6 weeks old and the presence of black, sunken patches on the roots have commonly occurred in beetroot grown in S. Rhodesia, particularly on soils with pH values of 6·5 to 7·5. Experiments are described which showed that the trouble is due to B deficiency. Broadcasting borax at the rate of $\frac{1}{5}$ oz. per square yard gave the best results.

3617. Brown, G. B.
Carrot and beet seed production as affected by steckling planting date and delayed planting after removal from storage.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 271-4, bibl. 1.
Beetroot and carrot roots were stored in good condition over winter in air-dry sand in a root cellar at a temperature range of 32° to 45° F. On removal from storage in the spring the roots were kept in bags for 0, 3, 6 and 9 days at about 70° F. before being planted out for seed production. The trial was repeated on 3 planting dates. With carrots plant survival and yield of seed were highest when the roots were planted immediately, and declined markedly with each delay of 3 days. The seed produced by the 4 lots did not show any significant differences in germination capacity. The earliest planting produced seed with the best percentage germination due probably to its greater maturity at harvest. With beetroot there was little difference in plant survival or seed yield between plants kept 0, 3 or 6 days before planting. Nine days' delay, however, decreased survival and yield significantly. Beet roots planted at the earliest date had a poorer survival and produced less seed than those planted at the two later dates. There was no difference in the germination of seeds produced under any of the treatments.—U.S. Dep. Agric., Cheyenne, Wyoming.

3618. Freeman, J. A., and Harris, G. H.
The effect of nitrogen, phosphorus, potassium and chlorine on the carotene content of the carrot.
Sci. Agric., 1951, **31**: 207-11, bibl. 12.
In an experiment with twelve fertilizer treatments it was shown that there was a linear relationship between the application of nitrogen and the carotene content of the carrots. The nitrogen applications provided 40, 80, 120 and 160 lb. N per acre. Phosphorus applications had no effect although the soil was deficient in phosphorus. Potassium applications had no effect, but there was adequate supply in the soil. The substitution of potassium chloride for potassium sulphate reduced the carotene content and it was concluded that chlorine was detrimental to the formation of carotene.
C.W.S.H.

3619. Booth, V. H.
Distribution of carotenoids in different parts of the carrot.
J. Sci. Food Agric., 1951, **2**: 350-3, bibl. 10.
The concentration of total carotenoids in various sections of the root of the carrot was studied by extracting the fat-soluble yellow pigment and estimating it colorimetrically. The concentration had a general fall longitudinally from crown to tip although there was a small increase just beyond half-way. The side roots and the "rat-tail" root had relatively very low concentrations of carotenoids. The pigmentation of xylem was always less, and varied much more, than that of the phloem but the two were positively correlated. Carotene comprised about 70% of the total

carotenoids in the xylem and this percentage was positively correlated with depth of pigmentation. The concentration of carotenols in xylems of different carrots was much more nearly constant than that of carotene. [Author's synopsis.]

3620. Booth, V. H.
Chromogenesis in stored carrots.
J. Sci. Food Agric., 1951, **2**: 353-8, bibl. 35.
Freshly harvested carrots were stored at about 6° C. in a closed tin box, loss of weight and mould growth being negligible. From time to time tiny cylinders were removed from each carrot and total fat-soluble pigment was extracted and estimated colorimetrically. This pigment increased during storage. The increase, which was unrelated to variety, age or initial pigmentation, reached a maximum of 11% ±3·3 in about 60 days and declined thereafter. The carotenol ("xanthophyll") fraction increased much more than the carotene fraction. No evidence was found for the conversion of any carotenoid pigment into a deeper one and the conclusion is reached that a colourless substance is converted into a coloured one. [Author's synopsis.]

3621. Vanderwalle, R., and Roland, G.
Contribution à l'étude de la jaunisse du navet. **(The yellowing disease of turnip.)** [Dutch summary 4 lines.]
Parasitica, 1951, **7**: 14-15, bibl. 2, illus.
A new virus disease of turnips, the symptoms being a yellowing or reddening of the leaves [*H.A.*, 21: 1683], was transmitted by the aphid *Myzus persicae*.

Salad crops.

3622. Stenuit, D., and Piot, R.
Recherches concernant l'apparition d'une coloration bleu-noirâtre des plantes, dans les forceries de chicorée-witloof. **(An investigation into a dark blue discoloration of forced chicory.)**
Courr. hort., 1951, **13**: 246-50, illus.
A blue discoloration of forced chicory was studied by means of water cultures and examinations of forcing soils. It is concluded that measures for avoiding this disorder include, (1) the use of soil that is free draining to a depth of at least 60 cm., (2) a pH of 7 or more, (3) a carbon content of 2% in the upper layer of the soil and 1% in the lower.

3623. Campacci, C. A.
A "ferrugem" do alho. **(Garlic rust.)**
Biológico, 1950, **16**: 185-7, illus.
Among the control measures recommended for *Puccinia allii* on garlic are a 4-5 year rotation, soil drainage, a limited use of organic manures, early and repeated spraying with 1% bordeaux mixture and tar soap, and the use of resistant varieties. In general the varieties with coloured skins are the most resistant.

3624. Heslep, J. M.
A study of the infertility of two acid soils.
Soil Sci., 1951, **72**: 67-80, bibl. 42.
It is shown that the primary cause of the poor growth of Romaine lettuce in the two acid California soils is a severe phosphorus deficiency, which is accompanied by an extremely high phosphate-fixing capacity of the soils. After the phosphorus deficiency is corrected, further substantial growth increases can be obtained by partly neutralizing soil acidity with either $Ca(OH)_2$ or MgO.—Univ. of Calif.

3625. Dewey, D. H.
Air blast and vacuum cooling of lettuce—temperature and moisture changes.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 320-6, bibl. 3, being *Pap. Dep. Veg. Crops Cornell Univ.* **335.**
Studies are described on the rate of cooling of lettuce in strong air blasts and in vacuums of about 4,600 microns of mercury compared with the rate of cooling in still air, and on the comparative moisture losses accompanying temperature changes. Vacuum cooling proved to be an extremely rapid method, temperatures at the centres of heads being lowered from as much as 23° C. to 0° C. in 5 minutes. Slightly greater moisture losses and shrinkage occurred in vacuum cooled lettuce than in heads cooled in air blasts of 2° C. and 70% relative humidity, but the market life of both was similar.

3626. Broadbent, L.
Lettuce mosaic in the field.
Agriculture, Lond., 1951, **57**: 578-82, bibl. 5.
Symptoms of the disease, its transmission by seed and aphids, its spread from crop to crop and methods for its control are described.—Rothamsted exp. Stat.

3627. Stitt, L. L.
Control of *Hylemya brassicae* in radishes.
J. econ. Ent., 1951, **44**: 87-9, bibl. 4, being *Sci. Pap. Wash. St. agric. Exp. Stat.* **983.**
Aldrin at 2·5%, chlordane at 5%, dieldrin at 2·5%, and parathion at 1%, applied by broadcasting, banding and furrowing, resulted in a significant reduction of the cabbage maggot in radishes. Lindane at 1%, while effective when applied in the furrow, caused off-flavour in the crop. Furrow and band applications required only $\frac{1}{2}$ to $\frac{1}{5}$ as much toxicant as the broadcast application. Some stunting of radishes was observed in greenhouse trials with lindane, BHC and chlordane.

3628. Shear, G. M.
Watercress growing.
Bull. Va agric. Exp. Stat. **424**, 1949, pp. 15, 1 ref. [received 1951].
The commercial production of watercress in Virginia is limited to the limestone valleys in the western part of the state. For the development of a commercial bed it is important that there should be a supply of spring water with a flow of several hundred gallons per minute. Practical information is given on the location, construction and maintenance of the beds, control of plant and animal pests, and harvesting and marketing.

3629. Blin, H.
Les cressonières: création et exploitation. **(Watercress beds: their establishment and management.)**
Rev. hort. Paris, 1951, **123**: 396-8, illus.
An account is given of the cultivation of water cress in ditches supplied with running water, in ponds or tubs in which the water can be renewed daily or weekly, and in soil. In the first case, a minimum of 25 l. of running water per minute is required for a ditch 1 m. wide and

50 m. long. Where river or spring water is not available, artesian wells may be used. When growing cress in soil, a shady position should be chosen and a trench dug 20-25 cm. deep and 50-100 cm. wide. This should be lined with planks or bricks, uncemented, and filled with 8 cm. sand covered by 8 cm. good soil. The soil should be kept moist by copious and frequent watering. Propagation, pests, harvesting and yields are dealt with.

3630. HOWARD, H. W., AND LYON, A. G.
Effect of light on the germination of watercress seeds.
Nature, 1951, **168**: 253-4, bibl. 3.
Whereas the seeds of *Nasturtium officinale* will germinate both in the light and in the dark, those of *N. microphyllum* were found to require a short exposure to light. The results of further experiments suggest (1) that light acts on the embryo and not on the testa, and (2) that inability to germinate in the dark is dominant to ability.—School of Agriculture, Cambridge.

Sweet corn.

(*See also* 3192, 3674r.)

3631. JOHNSTONE, F. E., JR., AND BUSHNELL, J.
Trials of sweet corn for fresh market.
Res. Circ. Ohio agric. Exp. Stat. **12,** 1951, pp. 8.
Mainly tabulated data on characters of 40 new yellow sweet corn hybrids in Ohio.

3632. MUHR, G. R., AND ROST, C. O.
The effect of population and fertility on yields of sweet corn and field corn.
Agron. J., 1951, **43**: 315-19, bibl. 7, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* **2604.**
When controllable growth factors, such as fertility and moisture, were brought near optimum, spacing and population definitely affected the yield and ear size of both sweet corn and field corn. As population increased, ear size of both sweet corn and field corn decreased, and the yield of field corn increased, the maximum yield being obtained with the densest population (31,360 plants per acre). With sweet corn the yield did not increase so much. This was due to an increase in barren stalks as population increased. Thinner stands of sweet corn (14,000-15,000 plants per acre) gave substantially better increases in yield than did field corn of the same population. Under these conditions many stalks of sweet corn produced two or more ears. Ear size declined as population increased. Field studies showed that yields of sweet corn increased as ear size increased and that the number of ears per acre did not increase after the average ear size had reached 0·71 lb. The data reported suggest that sweet corn should not be planted so closely as field corn.

3633. RUTSCHKY, C. W.
DDT emulsion controls earworms: other insecticides prove promising.
Science for the Farmer, June 1951, p. 10, illus., being *Suppl. 63rd A.R. Pa agric. Exp. Stat. 1949/50*, **3.**
In order to reduce earworm infestation in sweet corn to a low percentage with 5% DDT dust, at least 5 applications were found necessary. Infestation was reduced from 92% to 14% by 2 applications of 2% DDT emulsion in 7·5% mineral oil and water, but high residues of DDT remained. Methoxychlor and DDD also gave good control and have less dangerous residues.

3634. WILLIAMS, K. T., MCCOMB, E. A., AND WASHAUER, B. L.
Quick test of sweet corn quality.
Food Industr., 1950, **22**: 458-9, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **A.I.C.-218,** Suppl. 5, p. 6.
A rapid method for determination of moisture in sweet corn consists of grinding the corn, reacting a sample with calcium carbide, determining loss of acetylene formed by loss in weight, and calculating the water equivalent of the acetylene.

Sweet potatoes.

3635. DU TOIT, J. J.
***Pleospora herbarum* (Pers.) Rabh. (conidial stage *Stemphylium botryosum* Wallr.) on sweet potatoes.**
Sci. Bull. Dep. Agric. S. Afr. **301,** 1950, pp. 47, bibl. 24, illus., being *Stellenbosch-Elsenburg Series* No. **48.**
The fungus causing a tuber storage rot of sweet potatoes from the Cape Flats and also found on leaves, dead stalks and dead vines is described. Storage for 5 to 8 days at high temperature and under very humid conditions, followed by cooler storage conditions, greatly reduces the break-down losses caused by it.

3636. JEFFERS, W. F., AND MOORE, J. E.
Use of phenyl mercury triethanol ammonium lactate for control of sweet-potato diseases.
Abstr. in *Phytopathology*, 1951, **41**: 562.
This substance, as present in Puratized Agricultural Spray, has been shown by greenhouse and field tests to be effective in controlling wilt (*Fusarium oxysporum* f. *batatas*), and scurf (*Monilochaetes infuscans*), and to be helpful against black rot [*Ceratostomella fimbriata*] in sweet potato.

3637. SMOOT, J. J.
Streptomyces isolates pathogenic to sweet potatoes in Maryland.
Abstr. in *Phytopathology*, 1951, **41**: 565.
Three streptomyces isolates obtained from "poxed" sweet potatoes and pox-infested soil were pathogenic to sweet potatoes in laboratory and greenhouse tests. The symptoms were comparable with those caused by *Streptomyces ipomoea*. One of the three isolates showed physiological and cultural characters different from those of the other two and of *S. ipomoea*, and it is suggested that its occurrence in certain Maryland soils may explain why pox has not been satisfactorily controlled by applications of sulphur to lower the soil pH in certain areas.

3638. MOORE, J. E.
Comparison of certain sweet-potato varieties and their high carotene mutants as to susceptibility to disease.
Abstr. in *Phytopathology*, 1951, **41**: 564.
There were significant differences between certain of

the 6 varieties tested in their susceptibility to pox (*Streptomyces ipomoea*), scurf (*Monilochaetes infuscans*), stem rot (*Fusarium oxysporum* f. *batatas*) and incidence of cracking. Two of the high carotene mutants were more susceptible to scurf and one was less susceptible than the low carotene varieties from which they were selected.

3639. Wilcox, M. S., and Ezell, B. D.
Storage temperature and the development of internal cork in sweet potatoes.
Phytopathology, 1951, **41**: 477-8, bibl. 3.

In storage tests most roots were affected with internal cork [*H.A.*, 16: 1047] when stored at 70° F. While this temperature is higher than that generally recommended for sweet-potato storage, the results indicate that it is better for appraising internal cork susceptibility and latent infection.

Tomatoes.

(*See also* 3164, 3179, 3180, 3181, 3184, 3189, 3197, 3210, 3674e, f, k, q, 3711, 3750.)

3640. Wolgamot, I. H.
Tomatoes—facts for consumer education.
[*Publ.*] *U.S. Dep. Agric.* **AIB-32**, 1951, pp. 21, bibl. 34.

This is the first of a series of bulletins, each dealing with a single commodity, designed to supply extension workers, dietitians, etc., with information on food. In it are considered such subjects as quantities consumed, nutritive value, seasonal sources of supply, grading and uses.

3641. Anon.
Selecciones de tomate del Instituto de Fitotecnia. **(Tomato strains selected at the Institute of Plant Technology [Argentina].)**
Idia, 1950, **3**: 35/36: 12.

A brief note is given on the performance of tomato selections made at the Instituto Fitotecnia from local varieties and tested at various localities throughout the country. Several of the selections have proved superior to the standard varieties in respect of yield, length of fruiting period or disease resistance.

3642. Oppenheimer, C.
Experiments with tomato varieties and F-1 hybrids. [Hebrew with abridged English translation 8 pp.]
Reprinted from *Ktavim*, 1950, **1**: 27-34, 138-62, bibl. 5.

The results of tomato variety trials carried out at the Laboratory for Horticultural Plant Breeding in the Jordan Valley and in other tomato-producing districts of Palestine since 1940, which have so far only been published in Hebrew, are here summarized, and an account is given of further trials with 51 varieties and 21 F_1 hybrids which were made throughout the country during the unfavourable summer months. The results indicate that Bounty is a good summer variety giving high quality fruit and slightly better yields than the standard variety Marmande. Among the varieties deserving further trial, Pearl Harbour was exceptionally promising. Very considerable increases in yield were obtained by the use of F_1 hybrids, the best hybrids so far produced being Bison × N.35 and Marmande × N.35.

3643. Brežnev, D. D., and Aĭzenštat, Ja. S.
The problem of increasing the vitality of hybrid seed. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1951, No. 3, pp. 40-51, bibl. 5.

From a number of crossings made with tomato varieties it is concluded that the vitality of the hybrid progeny depends on the stage of growth of the parent plants at the time of pollination, and on the time and technique of crossing. Preliminary grafting and the addition of other pollen also exert some effect.

3644. Work, P., and Amy, A. S.
Tomato plant growing experiments in Puerto Rico.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 266-70, illus.

Preliminary experiments on methods of growing tomatoes in Puerto Rico are described. In a comparison of planting material of Marglobe tomatoes strong plants and medium plants significantly outyielded weak plants at odds of 19: 1 and 9: 1 respectively. In addition fewer replacements were needed among the stronger plants. In a rate of sowing experiment in outdoor and greenhouse seedbeds with 2, 4 and 8 seeds sown per inch, the difference in quality of plants produced was markedly in favour of the thinner rates of sowing. Similarly, when seedlings were thinned to spacings of 2, 1 and 0·5 in. in the rows, the wider spaced plants grew much more strongly.

3645. Reinders-Gouwentak, C. A., and Smeets, L.
Het opkweeken van stooktomaten met behulp van de hogedruk-kwiklamp Philips H.O.2000. **(Growing tomatoes under the high tension mercury lamp Philips H.O.2000.)**
[English summary ¾ p.]
Meded. LandbHoogesch. Wageningen, 1950, **50**: 61-71, bibl. 29.

Tomato plants were raised in mid-winter in a small greenhouse without showing sterility or other faults, by growing them under the high-tension mercury lamp Philips H.O.2000. The seed (Vetomold 121) was sown 14 December and the seedlings transferred to 14-in. pots on 9 February. The first truss appeared 1 March. During the first weeks the artificial light was supplied from 9 a.m. to 4 p.m., then from 8.30 a.m. to 4 p.m., and from 1 February until 1 March from 8 a.m. to 4 p.m., when the artificial illumination was stopped temporarily. Irradiation was started again on 11 March and, as by the end of March the flowers on the second truss were setting, the artificial light was supplied from 6 a.m. to 2 p.m. During the period of irradiation and thereafter the plants also got natural daylight.

3646. Anon.
Belichtingsproef op tomaten bij R. Vermeer, De Lier. **(A lighting trial with tomatoes.)**
Meded. Proefst. Groent. Fruit. Glas, 1950, No. 9, p. 6.

Artificial illumination of tomato seedlings with a high tension mercury lamp, from time of emergence to time of planting out, resulted in a 30% increase in yield during the first 5 weeks of cropping. Equally good results were obtained by illumination until time of

potting up, followed by 5 sprays with 10% sugar solution.

3647. KRUŽILIN, A. S., AND MIHALEV, A. JA.
The water relations and assimilation of heat resistant varieties of tomato. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 1073-5, bibl. 4.
Varieties distinguished by their resistance to unfavourably low moisture conditions, and by their high rate of assimilation, in the hot dry climate of southern U.S.S.R., show also greater resistance to the stolbur disease and give greater yields. The water relations, and transpiration and assimilation rates are tabulated for three varieties of tomato. The selection of varieties for those regions should be based on physiological characters such as those mentioned.

3648. SKRIPICYNA, N. E.
The effect of 2,4-D on tomatoes with various amounts of mineral fertilizers. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **75**: 457-60, bibl. 3.
The application of 2,4-D to tomatoes increases the effectiveness of fertilizers and assists the flow of assimilata to the reproductive organs at the expense of the vegetative organs. It is most effective with the higher amounts of fertilizer.

3649. EPSTEIN, E., AND STOUT, P. R.
The micronutrient cations iron, manganese, zinc, and copper: their uptake by plants from the adsorbed state.
Soil Sci., 1951, **72**: 47-65, bibl. 29.
This is a study of the uptake by tomato plants of the micronutrient cations adsorbed on soil cation-exchange materials at low concentrations. Bentonite was the adsorption medium used, and radioactive isotopes of iron, manganese, and zinc were the tracers.—Univ. of Calif.

3650. KACNELJSON, S. M.
The relation of tomatoes to different forms of phosphate in different periods of growth. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 779-82, bibl. 2.
Experiments were carried out on tomato plants with two phosphorus compounds, viz. superphosphate (easily soluble) and phosphorite flour (soluble with difficulty). Results obtained indicate that the latter is very slightly assimilated in the early stages of growth (the first 15 to 20 days); later the ability to assimilate it significantly increases.

3651. NICHOLAS, D. J. D.
Some effects of metals in excess on crop plants grown in soil culture. I. Effects of copper, zinc, lead, cobalt, nickel and manganese on tomato grown in an acid soil.
FORSTER, W. A.
II. Effects of copper and zinc on crop plants grown in a variety of soils.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 96-114, bibl. 20.
Part I: Market King tomatoes were grown in a sandy loam (pH. 5·5) in a factorial pot experiment. The effects of adding Cu, Zn, Pb, Co, Ni and Mn respectively at 0, 5 and 10 m. eq. rates to the soil were studied. The effects are discussed and the visual symptoms of the various excesses noted.
Part II: Large amounts of copper and zinc sulphate solutions were applied to the neutral and acid soils in randomized pot trials on tomato, sugar beet and cauliflower. Tomato proved the most susceptible to Zn or Cu injury. The toxicity symptoms, which are fully described, usually appeared first in the older leaves. Symptoms varied in the same crops with soil, rate of application, time of year and frequency of application.

3652. HEWITT, E. J., AND JONES, E. W.
The effect of zinc and copper deficiencies on crop plants grown in sand culture.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 56-63, bibl. 34.
The only horticultural plant under test was tomato. This showed acute visual symptoms of both zinc and copper deficiencies and crop reduction. These are described.

3653. SAYRE, C. B., PEW, W. D., AND PATTERSON, M. E.
Comparative yields of 5 varieties of tomatoes harvested at mature-green and red-ripe maturity.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 337-42, bibl. 1, being *J. Pap. N.Y. St. agric. Exp. Stat.* **815.**
All the 5 varieties in this experiment produced heavier yields when harvested green-mature than at red-ripe maturity. The individual fruits weighed less when green-mature and caused less drain on the vines, which resulted in the development of a much larger number of marketable fruits per vine and larger total yields. The Rutgers variety produced larger fruits but significantly less tonnage per acre both green wrap and red ripe than any of the other varieties in the test. The three new varieties Gem, Red Jacket, and Longred compared very favourably both in green wrap and red ripe yields with the former leading commercial canning variety, John Baer, in early and total yields and in the production of U.S. No. 1 grade fruit. The uniform colour gene varieties require more skill and judgment in picking for green wraps. For maximum returns, tomatoes for green wraps must be picked at least twice a week, while for red ripe tomatoes for canning intervals of 7 to 12 days between picking are satisfactory. [Authors' conclusions.]

3654. HALSEY, L. H., AND JAMISON, F. S.
Yields of tomato varieties harvested at two stages of maturity from staked and unstaked plants.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 332-6.
In trials over 3 successive seasons at Gainesville, Florida, with 5 tomato varieties, pruned, staked plants gave significantly higher total yields than unpruned, unstaked plants, but there were no significant differences in the yields of marketable fruits owing to greater losses through cracking among fruits from the staked plants. There were no appreciable differences in total yields when fruit was harvested mature-green or pink (i.e.

when the colour had changed at the blossom end), but, with the latter, delay in harvesting markedly increased the incidence of cracking and resulted in highly significant reductions in the yields of marketable fruits.

3655. Moore, J. F.
Use of a para-chlorophenoxyacetic acid spray and two pruning systems to increase yield and fruit size of field-grown tomatoes in Western Washington.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 299-302, bibl. 9, being *Sci. Pap. Wash. St. agric. Exp. Stats.* **897.**

Five tomato varieties, Bounty, Early Chatham, Earliana, Burpeeana Early Hybrid, and Fordhook Hybrid, were grown in the field and one series of plots received blossom sprays of para-chlorophenoxyacetic acid, another was pruned to two branches per plant, a third was pruned to three branches per plant, and a fourth was left unsprayed and unpruned as a check. Fruit size and yield were significantly increased by spraying the blossom clusters six times at weekly intervals beginning 25 June with 30 p.p.m. para-chlorophenoxyacetic acid. Pruning had little effect on yield or fruit size. [Author's summary.]

3656. Gorter, C. J.
The influence of 2,3,5,-triiodobenzoic acid on the growing points of tomatoes. II. The initiation of ringfasciations.
Reprinted from *Proc. kon. ned. Akad. Wetensch.*, 1951, **54C**: 181-90, bibl. 13, illus., being *Publ. Lab. TuinbPl., Landb-Hoogesch, Wageningen* **97.**

TIBA was applied to the cotyledons of tomato seedlings in a paste consisting of 50 mg. TIBA, 5 g. woolfat and 5 ml. water. This treatment greatly reduced the growth of the plants and induced the formation of ringfasciated stems on the main axis and frequently on the side axes. Ringfasciations occur as rare phenomena in nature and this is the first time that they have been induced artificially. They are characterized by a ringlike growing point which gives rise to a hollow stem. In the TIBA-treated tomatoes the ringfasciated stems had no leaves or bracts either on the inner or outer wall, but buds, which were mainly flower buds, formed on the rim. Thus a ringfasciated inflorescence with a great many flowers developed. In one case a treated plant produced 72 flower buds, compared with 11 on the control. A transverse section through the ringfasciation showed 2 vascular rings, the outer one in normal orientation, the inner one in inverse orientation. The development and anatomy of the ringfasciation is illustrated in a series of excellent drawings and photographs.

3657. Castronovo, A., and Rotaeche, C. E.
Una nueva alteración teratológica en la flor de tomate. **(A new type of malformation in tomato flowers.)**
Rev. argent. Agron. B. Aires, 1950, **17**: 114-19, bibl. 2, illus., being *Publ. Inst. Fitotec. B. Aires* **95.**

After mentioning some of the types of morphological aberration that commonly occur in tomato flowers, the authors describe and illustrate in more detail a hitherto unrecorded type of malformation. The fasciated flowers were very large with numerous petals, sepals and stamens frequently adhering to the ovary. The styles were fasciated and in the form of a hollow cylinder. The inside of the style cylinders and the circular stigmas gave rise to further sepals, petals and stamens. Intermediate forms have also been observed.

3658. Severin, H. H. P.
Multiple viruses of tomato inducing fruit malformation and leaf symptoms.
Hilgardia, 1950, **20**: 109-36, bibl. 9, illus.

Studies are described on the symptoms induced in tomatoes by three virus complexes: western cucumber and ordinary tobacco mosaic, celery calico and ordinary tobacco mosaic, and common cucumber and ordinary tobacco mosaic. The first two complexes produce the more severe malformations of leaves, flowers and fruits, but are not readily distinguishable from each other. Studies are also described on the separation of the viruses in the first complex by heat, and on the aphid vectors of western cucumber mosaic virus.

3659. Severin, H. H. P.
Symptoms of the celery-calico virus on tomato plants.
Hilgardia, 1950, **20**: 137-45, bibl. 5, illus.

The symptoms of the celery-calico virus on the leaves of Marglobe tomato plants are described and compared with those produced at low temperatures by the western cucumber mosaic virus.

3660. Goldin, M. I., and Parievskaya, A. P.
Woodiness of tomatoes in the Crimea. [Russian.]
Microbiology, 1950, **19**: 527-31, from abstr. in *Rev. appl. Mycol.*, 1951, **30**: 348.

Experiments carried out in the summer of 1949 at the Microbiological Institute of the U.S.S.R. Academy of Sciences, Moscow, confirmed that *Hyalesthes obsoletus* is the main vector of the woodiness disease of tomatoes [tomato big bud virus] in the Crimea. The disease was most prevalent in the Zuisk district, where the insect was very abundant. In field tests under natural conditions of infection, the "stemmed" varieties Jubilee, Alpateva, and Gribovsky were the most resistant, being free from infection in three different localities.

3661. McClean, A. P. D.
Bunchy-top disease of the tomato: additional host plants, and the transmission of the virus through the seed of infected plants.
Sci. Bull. Dep. Agric. S. Afr. **256,** 1948, pp. 28, bibl. 2 [received 1951].

Bunchy-top virus was transmitted to the following additional species of Solanaceae: *Datura stramonium, Nicotiana glutinosa, Physalis angulata, Solanum giganteum, S. indicum,* and *S. sisymbrifolium.* The reaction of the species to infection is described. The flowers of petunia and *Nicotiana glutinosa* develop characteristic symptoms and this makes the two species useful as differential hosts. The virus not only became established in the mature seed of some of the species, but in *Solanum incanum* and *Physalis peruviana* was transmitted to some of the seedling plants.

3662. Giddings, N. J., Bennett, C. W., and Harrison, A. L.
A tomato disease resembling curly top.
Phytopathology, 1951, **41**: 415-17, bibl. 3, illus.
This disease, seen in Florida, is not transmitted by juice inoculation methods but is readily transmitted by grafting. The symptoms resemble those of tomato curly-top, but whether the virus is related to the curly-top virus has not yet been determined.—Veg. Crops Lab., Bradenton, Florida.

3663. Lackey, C. F.
Histological studies of a tomato disease resembling curly top.
Phytopathology, 1951, **41**: 418-19, illus.
Differences are shown between this disease [see preceding abstract] and curly top that are undetectable from the external anatomy of the infected plants—U.S. Sugar Plant Field Lab., Riverside, California.

3664. Jacynina, K. N.
Canker-resistant varieties of tomato. [Russian.]
Sad i Ogorod, 1951, No. 1, pp. 57-8.
An account is given of hybridization experiments with the object of raising tomato varieties resistant to bacterial canker [? *Corynebacterium michiganense*]. After several crossings promising results were obtained and two resistant hybrids with good qualities are described.

3665. Anon.
Early blight or target spot of tomatoes.
Agric. Gaz. N.S.W., 1951, **62**: 34-5, illus.
Early blight [*Alternaria solani*] of tomatoes is frequently very destructive in the coastal regions of New South Wales. All varieties are susceptible. Control measures include seed treatment (submersion in water at 122° F. for 25 min. and dusting with fungicides), using virgin seed-beds, sowing thinly, rotation, the application of 2-2-40 bordeaux mixture as soon as the first two true leaves have appeared and a day or two after transplanting, collecting and burning all plant remains.

3666. Strong, M. C.
Preliminary tests of fungicide combinations in tomato sprays and dusts.
Quart. Bull. Mich. agric. Exp. Stat., 1951, **33**: 320-5, illus., being *Contr. Dep. Bot. Plant Path. Mich. St. Coll.* **51-4.**
In order to provide simultaneous control of tomato blights and anthracnose, 4 fixed copper fungicides were combined with Zerlate in sprays and dusts. None of the combinations tested was toxic to plants, the spray mixtures did not break down, and no apparent interaction of chemicals took place during dusting. For blight control, the sprays were more effective than the corresponding dusts, and the addition of Zerlate gave protection against anthracnose.

3667. Edwards, G. R.
Insect pests of tomatoes.
J. Dep. Agric. S. Aust., 1951, **54**: 343-8, 382-90, illus.
The following pests of tomatoes in South Australia are described with recommended control measures:—tomato fruit worm (*Heliothis armigera*), bronze surface mite (*Phyllocoptes lycopersici*), eelworm (*Heterodera marioni*), potato moth (*Gnorimoschema operculella*), cutworms (*Noctuidae*), wireworms and related pests, thrips (*Thysanoptera*), green vegetable bug (*Nezara viridula*), leaf hoppers (*Jassidae*). Pests of minor importance mentioned are the Rutherglen bug (*Nysius vinitor*), red-legged earth mite (*Holotydeus destructor*), leaf-eating looper (*Plusia* sp.), white fly (*Trialeurodes vaporariorum*), metallic tomato fly (*Lonchaea aurea*), brown vegetable weevil (*Listroderes costirostris*), and aphids (*Macrosiphum solanifolii* and *Myzus persicae*).

3668. Wilcox, J., and Howland, A. F.
Tests of new insecticides for control of tomato insects in southern California.
J. econ. Ent., 1950, **43**: 883-7, bibl. 2.
In trials from 1945 to 1949 excellent control of the tomato fruitworm, *Heliothis armigera*, was obtained with dusts containing 5% or 10% DDT or TDE, 1% aldrin, or 5% chlordane plus 5% DDT, and also with concentrated sprays of 2·5% DDT or 5% of toxaphene emulsion. Dusts containing 5% or 10% DDT, 5% TDE, 10% toxaphene or 75% calcium arsenate were effective against the beet army-worm, *Laphygma exigua*; 10% DDT dust was satisfactory against hornworms, *Protoparce* spp.; and 25% sulphur dust against the tomato russet mite, *Vasates destructor*.

3669. Nishida, T., and Bess, H. A.
Applied ecology in melon fly control.
J. econ. Ent., 1950, **43**: 877-83, bibl. 8, being *Tech. Pap. Hawaii agric. Exp. Stat.* **201.**
The habits and movements of the adults of the melon fly, *Dacus cucurbitae*, have been studied in Hawaii, and preliminary control tests have been made with DDT sprays, particularly an oil emulsion containing 10% to 12% DDT. Thorough mist blower spraying of vegetation adjacent to crop areas between sunset and 7 to 8 a.m. practically eliminated the fly population within 50 to 100 ft. of the machine. Where 4 such spray applications were made at weekly intervals, the average infestation of tomato fruits in the fields surrounded by treated area was only 3% compared with 65% in untreated controls.

3670. Kevorkian, A. G.
The "white mold" disease of tomatoes in Cuba.
Abstr. in *Phytopathology*, 1951, **41**: 563.
The mite, *Eriophyes cladophthirus*, the responsible agent of this disease, is particularly active in February and March when temperatures are low and relative humidity high. Early symptoms are a downy-white to greyish fuzz; later the leaves are curved or rolled downward, and growth is arrested. Of varieties and hybrids tested none was immune. Flowers of sulphur dusted or sprayed, 4 lb./100 gal. water, applied twice at a 2-week interval, controlled the disease.

Other crops.

3671. do Amaral, J. F.
Doença da beringela causada por *Phomopsis*. **(A disease of eggplants caused by a species of *Phomopsis*.)**
Biológico, 1951, **17**: 86-7.

A fruit rot and leaf spot of eggplants, which has recently become widespread in São Paulo, Brazil, is caused by the fungus *Phomopsis*. Symptoms of the disease and methods of control are described. The latter include the use of clean seed, disinfection of the seeds in a 1: 1,000 solution of corrosive sublimate for 10 minutes, fortnightly preventive sprays of 1% bordeaux mixture, and a 3-year rotation of crops. Eggplant is the only host of the fungus.

3672. HAYTER, C. N.
The oyster or kweme nut (*Telfairia pedata* Hook).
Rhod. agric. J., 1951, **48**: 14-18, bibl. 8, illus.

The oyster nut belongs to the Cucurbitaceae, the edible seeds or "nuts" being produced in large gourds. It is believed to be indigenous to tropical West Africa and was introduced into Southern Rhodesia in 1940. This article contains a brief note on its history, a description of the plants, both male and female, and of the fruit, and notes on the uses and composition of the nuts. Propagation by seed or cuttings, planting out and yields based on experience in Southern Rhodesia are described. The author considers the crop could be a very profitable side-line where growers have deep, fertile soils, with abundant moisture and no risk of severe frosts.

3673. HODGE, W. H.
Three native tuber foods of the high Andes.
Econ. Bot., 1951, **5**: 185-201, illus.

The three tuber-producing crops described are oca, *Oxalis tuberosa* (Oxalidaceae); ullucu, *Ullucus tuberosus* (Basellaceae); and añu, *Tropaeolum tuberosum* (Cruciferae). They are all native to, and grown in, the Andean highlands between 9,000 and 14,000 feet. Unlike the potato, they have not spread to other parts of America. C.W.S.H.

Noted.

3674.

a ATTIA, M. S., AND MUNGER, H. M.
Self-incompatibility and the production of hybrid cabbage seed.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 363-8, bibl. 7, being *Pap. Dep. Plant Breed. Cornell Univ.* **259.**

b ATTIA, M. S.
The nature of incompatibility in cabbage.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 369-71, bibl. 3.

c BANGA, O., AND OTHERS.
4e beschrijvende rassenlijst voor groentegewassen. [Groentegewassen, tuinbouwmaïs, tabak, aardbei, geneeskrachtige en aromatische kruiden.] 1951. **(Fourth descriptive variety list of vegetable crops. [Dutch vegetables, sweet corn, tobacco, strawberries, medicinal and aromatic herbs.] 1951.)**
[*Publ.*] *Inst. Vered. Tuinbouwgew., Wageningen*, 1951, pp. 172, f. 1.50.

d BEAUMONT, A.
On the *Ascochyta* spot disease of broad beans.
Trans. Brit. mycol. Soc., 1950, **33**: 345-9, bibl. 13, illus.
Use clean seed!

e BOUHELIER, R.
Notes sur la culture de la tomate. **(Notes on tomato growing [in Morocco].)**
Terre maroc., 1951, **25**: 16-17.

f DENNETT, R. K.
The association of resistance to fusarium wilt and stemphylium leaf spot in tomato, *Lycopersicon esculentum*.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 353-7, bibl. 13, being *Tech. Pap. Hawaii agric. Exp. Stat.* **203.**

g GLENDENNING, R., AND FULTON, H. G.
Carrot rust fly [*Psila rosae*].
Proc. Publ. Canada Dep. Agric. Div. Ent. **91,** 1951, pp. 4.

h HAGEDORN, D. J.
The reaction of perfection-type peas to Wisconsin bean virus 2 isolates from pea.
Phytopathology, 1951, **41**: 494-8.

i HALL, C. B., MARSHALL, A., AND HARTMAN, J.
Studies on the volatile constituents of peas and asparagus.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 315-19, bibl. 3, being *Pap. Dep. Veg. Crops Cornell Univ.* **334.**

j HEWITT, E. J.
Experiments on iron metabolism in plants. III. The relation of molybdenum and nitrogen supply to metal-induced iron deficiency in sugar beet.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 64-70, bibl. 4.

k HUNZIKER, A. T.
Estudios sobre *Solanaceae*. I. Sinopsis de las especies silvestres de *Capsicum* de Argentina y Paraguay. **(Studies on Solanaceae. I. A synopsis of the wild species of *Capsicum* found in Argentina and Paraguay.)**
Darwiniana, 1950, **9**: 225-47, bibl. 9, illus.

l MORRIS, H. J., OLSON, R. L., AND BEAN, R. C.
Processing quality of varieties and strains of dry beans.
Food Technol., 1950, **4**: 247-51, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **A.I.C.-218,** Suppl. 5, p. 6.

m NAKAGAWA, Y.
Bulb onion culture in Hawaii.
Agric. Ext. Circ. Hawaii agric. Ext. Serv. **301,** 1951, pp. 14, bibl. 11.

n NAKAGAWA, Y.
Snap bean production in Hawaii.
Agric. Ext. Circ. Hawaii agric. Ext. Serv. **306,** 1951, pp. 13, bibl. 5.

o NAKAGAWA, Y.
Bell pepper production in Hawaii.
Agric. Ext. Circ. Hawaii agric. Ext. Serv. **302,** 1951, pp. 11, bibl. 4.

p ODLAND, M. L., AND ISENBERG, F. M. R.
The value of asexual propagation in the production of F_1 hybrid cabbage seed.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 372-6, bibl. 5, illus., being *Pap. J. Ser. Pa agric. Exp. Stat.* **372.**
With 3 types of cutting.

q PAREJA, I. E.
Tomato-seed oil.
Farm. Chilena, 1950, **24**: 397-9, from abstr. in *Oléagineux*, 1951, **6**: 387.
Production and economic importance of the oil is dealt with.

r RAYMOND, C. B., AND SWEET, R. D.
Sweet corn.
Ext. Bull. Cornell Agric. Exp. Stat. **819,** 1951, pp. 16, illus.

s REYNOLDS, J. D.
Pea growing in Holland and Belgium. I. General husbandry.
Agriculture, Lond., 1951, **58**: 122-7.

t SEVERIN, H. H. P., AND KLOSTERMEYER, E. C.
***Colladonus geminatus* and *C. montanus*. Life histories on virus-infected and on healthy plants [of celery].**
Hilgardia, 1950, **19**: 550-60, bibl. 3, illus.

u STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Sorts- og stammeforsøg med vinterporre. 1946-48. **(Trials with varieties and strains of leek 1946-48.)**
Tidsskr. Planteavl, 1950, **54**: 173-5, being *Medd. Stat. Forsøgsvirks. Plantekult.* **449.**

v TOMETORP, G., AND HINTZE, S.
Klassificerande försök med drivpersilja och vinterdrivrädisa 1947-1950. **(Trials with new varieties of parsley and winter radish for forcing, 1947-50.)** [English summary 1¼ pp.]
Medd. Trädgårdsförs. Malmö **60,** 1950, pp. 14, bibl. 4.

w VISMARA, C. A.
Mejoramiento de repollo (*Brassica oleracea* var. *capitata* L.). **(Cabbage improvement.)** [English summary ½ p.]
Rev. Fac. Agron. La Plata, 1950, **27**: 233-47, bibl. 10, illus.
A survey of aims and methods, based on observations made at the Instituto Fitotécnico de Santa Catalina, Argentina.

x WILSON, J. D.
Ohio MR17. A new mosaic tolerant pickling cucumber.
Res. Circ. Ohio agric. Exp. Stat. **10,** 1951, pp. 8.

y ZIMMERMAN, J. F., BERRY, L. J., AND CRENSHAW, J. L.
Studies of onion root respiration. IV. Kinetics of the respiratory overshoot. [Summaries in French and German 9 and 11 lines respectively.]
Biochim. biophys. Acta, 1951, **7**: 115-25, bibl. 16.

POTATOES.

General.

(*See also* 3510, 4101 and annual report section.)

3675. STEVENSON, F. J.
The potato—its origin, cytogenetic relationships, production, uses and food value.
Econ. Bot., 1951, **5**: 153-71, bibl. 16, illus.
An outline is given of all aspects of potato production and utilization. The history of potato cultivation is traced and an account given of recent expeditions to South and Central America for the collection of *Solanum* species. Information regarding wild species, their chromosome numbers, distribution and their ability to cross is taken largely from Hawkes's work. In breeding work the best results have been obtained from *S. demissum*, and *S. tuberosum* crosses. Much cytological and genetical work on *S. tuberosum* has been carried out, but the exact nature of polyploidy in the potato is not yet understood. 91% of the potato crop is produced in Europe. In the United States the acreage is restricted owing to the ability of that country to produce huge crops of maize which is, in some respects, an alternative product. The potato has, in comparison, a low starch content and a short life in store. Over half the world the crop is mainly used for livestock feeding. Other important uses are in starch and alcohol manufacture. Food value and vitamin content are discussed; the potato is an important source of vitamin C. C.W.S.H.

3676. HOPKINS, J. C. F.
Diseases of fruit, flowers and vegetables in Southern Rhodesia. 5. Diseases of potatoes. (Revised).
Rhod. agric. J., 1951, **48**: 19-33, bibl. 4, illus.
Symptoms, contributory conditions and control measures are given for early blight (*Alternaria porri* f.sp. *solani*), late or Irish blight (*Phytophthora infestans*) which has been reported as only occurring once in S. Rhodesia, black scurf (*Corticium solani*), sun scorch or tip burn, hopper burn (due to leafhopper attacks), mildew (*Erysiphe cichoracearum*), bacterial wilt (*Pseudomonas solanacearum*), wilts (*Verticillium albo-atrum* and 3 spp. of *Fusarium*), stem and root rot (*Sclerotium rolfsii*), black dot (*Colletotrichum atramentarium*), common scab (*Actinomyces scabies*), powdery scab (*Spongospora subterranea*), brown fleck or spraing,

internal browning, black heart, hollow heart, white skin spot, spindle sprout, storage rots, and the degeneration diseases, leaf-roll, leaf-drop streak, wildings and bolters.

Breeding and varieties.

(*See also* 3724e, g.)

3677. Pal, B. P., and Pushkarnath, —.
Potato-breeding investigations in India.
Emp. J. exp. Agric., 1951, **19**: 87-103, bibl. 28.
An account is given of work carried out mainly at the Simla branch of the Indian Agricultural Research Institute during the past 14 years.

3678. [Statens Forsøgsvirksomhed i Plantekultur.]
Dyrkningsforsøg med tidlige spisekartofler. 1945-1948. **(Trials with early potato varieties, 1945-48.)**
Tidsskr. Planteavl, 1950, **54**: 161-3, being *Medd. Stat. Forsøgsvirks. Plantekult.* **445.**
In trials with early potato varieties, carried out on a range of soils at the Danish experiment station, Primula held the first place in respect of yield and quality. The variety is also resistant to splitting, a common trouble in Danish smallholdings.

3679. Turlapova, A.
New varieties of potato. [Russian.]
Kolhoz. Proizv., 1951, No. 5, pp. 34-5, illus.
New varieties of potato are now replacing the older varieties grown in the U.S.S.R. They are immune to wart disease and some of them also to blight (Phytophthora). Some of the southern grown varieties are tolerant of high air temperatures and need not be irrigated. Others are early enough to yield well in the northern regions and in the Urals. The special qualities of certain varieties are described.

3680. Service de l'Horticulture, Mission Horticole, Rabat.
Compte rendu d'un essai comparatif de 6 variétés de pommes de terre à la Station Régionale Horticole de Dar Bouazza. **(A report on a comparative trial of 6 varieties of potato at the Dar Bouazza regional horticultural station.)**
Terre maroc, 1951, **25**: 153-5.
The tabulated results show that, of the 6 varieties tested, Furore gave the highest yield and Royal Kidney the lowest, while B.F.15 gave the highest percentage of tubers of medium size.

Propagation and planting.

3681. Montaldo B., A.
Producción de semilla de papa. **(Seed potato production [in Chile].)** [English summary ⅔ p.]
Agric. téc. Chile, 1950, **10**: 32-42.
Yields of seed potatoes in Chile are low as a result of the prevalence of common scab, powdery scab and root-knot eelworm. It is suggested that seed potatoes should be grown on the large areas of virgin soil which are available. A certification scheme was introduced in 1937, but failed as a result of the unsuitableness of the varieties chosen for certification. Variety trials, which have been carried out during the last 8 years at the Centinela Experiment Station, Puerto Octay, Chile, have shown that, of the imported varieties, President, Alpha and Industrie give the highest yields. Katahdin yielded very poorly. New varieties have also been developed at the Experiment Station, of which the most promising are the seedlings C-8 and 1248, which show some resistance to nematode attack, and the varieties 224 and 1239.

3682. Fernow, K. H., and Garcés O., C.
Producción de semilla certificada de papa. **(Production of certified seed potatoes [in Colombia].)**
Rev. Fac. nac. Agron. Colombia, 1949, **10**: 257-95, illus. [received 1951].
These directions to seed potato growers are concerned mainly with the recognition and control of the pests and diseases most common in Colombia.

3683. Kopetz, L. M.
Licht- oder Dunkelkeime ? Ein Beitrag zur Frage der Vorbehandlung von Kartoffelsaatgut. Vorläufige Mitteilung. **(Sprouting potatoes in the light or in the dark ? A contribution to the pre-treatment of seed potatoes. Preliminary communication.)**
Bodenkultur, 1950, **4**: 422-5.
Sprouting potatoes in the light involves a readaptation of the sprout to the darkness of the soil with the result that development is delayed. The combined light-darkness treatment applied experimentally aims at activating the hormones in the light and subsequently letting the sprouts grow in the dark, which was achieved by cutting out the light 3-4 weeks before planting. In a planting of the variety Erstling so carried out, sprouts had emerged from 86 tubers on 24 April, 1950, and from 91 tubers on 27 April, as against 49 and 62 plants emerged from tubers sprouted in the light. In a further trial, sprouts developed in the dark were allowed to grow to a length of 30-50 cm. [It is not stated how long before planting the light should be cut out.] This treatment is reported to result in the formation of many more shoots from the sprouts and in a larger crop of potatoes, as borne out by practical experience. The author is confident that the extra time required for planting tubers with long sprouts [in furrows] is amply repaid by higher yields.—Agricultural College, Vienna.

3684. Hooghoudt, S. B.
Vierde mededeling omtrent het grond waterstandproefveld op de proefboerderij "Jacob Sijpkens Heerd" te Nieuw-Beerta. **(Fourth report on the soil water level trial field "Jacob Sijpkens Heerd" at Nieuw-Beerta.)**
Reprinted from *Maandbl. LandbVoorld*, 1950, **7**: 3: 106-14.
The trial field was divided into 5 plots which were maintained at a constant water level of 40, 60, 90, 120 or 150 cm. below the surface. In the 1947-48 season cereals and caraway were grown on each of the plots. Although the caraway crop failed as a result of caraway

moth attack, growth was best, as in the previous year, at the 40 and 60 cm. water levels, and moth attack was least severe on these plots. In the 1948-49 season seed potatoes, variety Saskia, were among the crops grown. The lowest yield was obtained from the 40 cm. water level plot, and this was also the most difficult to harvest. Differences between the other plots were small. The effect of water level on the structure of the soil was also studied.—Agric. Res. Stat. and Soil Sci. Inst., T.N.O., Groningen.

3685. ŽUKOVA, G.
Plant potatoes in "nests" on the square. [Russian.]
Kolhoz. Proizv., 1951, No. 4, pp. 20-2, illus.

A method of planting potatoes in "nests" which are mounded up is described. The advantages are that cultivation can be done in two directions, the destruction of weeds is easier and deeper cultivation is possible. A table shows increases in yield over ordinary planting of from 40 to 90 centners per hectare. The method of marking out the field on the square is described. At each intersection two potatoes are planted and covered by soil with a horse- or tractor-drawn plough.

Cultivation and nutrition.

(*See also* 3164, 3213.)

3686. KUNKEL, R., GARDNER, R., AND BINKLEY, A. M.
Fertilization of Red McClure potatoes in the San Luis Valley of Colorado.
Tech. Bull. Colo agric. Exp. Stat. **43**, 1951, pp. 30, bibl. 9.

The effects of fertilizer and minor elements on yield, grade, colour, specific gravity and keeping quality of Red McClure potatoes were studied in a 4-year trial at the San Luis Valley Branch Station, Center, Colorado, and the effects on yield were studied over a period of 2 years in commercial fields. The total yield per acre increased as the amounts of N and P_2O_5 were increased to 40 and 160 lb. per acre respectively. As the total yield increased, the yield of U.S. No. 1 tubers above 2 in. in diameter also increased. The beneficial effect of K appeared to be questionable. High yields were maintained over a period of 4 years with applications of 40 lb. N, 160 lb. P_2O_5 and 20 lb. K_2O per acre, but the results varied on different farms. The effects of fertilizers and minor elements on colour and specific gravity at harvest time and on loss of colour, changes in specific gravity and loss due to shrinkage and decay in storage were unimportant. The addition of the sulphates of Cu, Fe or Mn, with or without sulphur, to the fertilizer was of no benefit. Ammonium nitrate and ammonium sulphate were about equal as sources of N when equivalent amounts of N were applied.

3687. LARSON, C.
Den lokala gödslingsförsöksverksamheten. Sammanställningar av försöksresultat under åren 1921-1940. II. Sydsvenska Höglandet. **(Local manurial trials. A summary of the results obtained 1921-1940. II. The Highlands of southern Sweden.)** [English summary 2½ pp.]
Medd. Lantbruksh. Jordbruksf. **30**, 1950, pp. 268.

Scope and object of the numerous manurial trials, carried out on different soils in the Highlands of southern Sweden, were set out in the first report (*Medd.* 2, 1939). Experiments with potatoes, included to a limited extent, showed that a generous supply of dung increased the yield considerably but had no influence on the effect of nitrogen or phosphate applications while, on the other hand, the effect of potash applications decreased with rising supplies of dung.

3688. OLSEN, S. R., AND OTHERS.
Utilization of phosphorus by various crops as affected by source of material and placement.
Tech. Bull. Colo agric. Exp. Stat. **42**, 1950, pp. 43, bibl. 15.

Experiments, mainly in Colorado, are described in which phosphorus in up to 7 different forms was applied to potatoes, sugar beet, wheat, barley and alfalfa. With potatoes the forms of P used were superphosphate, ammonium phosphate, and calcium metaphosphate applied at the rate of 80 lb. P_2O_5 per acre, radioactive P being added to each fertilizer. At each of 4 sampling dates all 3 fertilizers had furnished about equal amounts of P to the plants. The potatoes absorbed more P when the fertilizer was placed 4 in. below the seed than when it was placed 2 in. below it.

3689. JONES, E. W.
Experiments on iron metabolism in plants. IV. The interrelationship of iron and potassium in the potato as affected by the presence of calcium carbonate.
A.R. Long Ashton agric. hort. Res. Stat. 1950, 1951, pp. 71-83, bibl. 8.

(1) As before [see *H.A.*, 20: 2895] Majestic potato plants were grown in sand culture with 4 levels of iron and 4 levels of potassium, with or without the addition of calcium carbonate. (2) Previous observations were confirmed. Additional symptoms included necrotic veining in plants deficient in both iron and potassium, forward rolling of leaves in plants given high iron and potassium together with suspected calcium deficiency. (3) Calcium carbonate did not alter the type of visual response observed but modified their severity, or the threshold levels at which they appeared. (4) Potassium or iron (up to the Fe_2 level) increased, whereas calcium carbonate decreased the total dry weight of shoots. Both total yield and average weight of tuber increased with iron up to the Fe_3 level and then decreased; calcium carbonate decreased the total yield, but increased the average weight, of tubers, potassium increased both. (5) Increased iron or potassium supply increased, and calcium carbonate decreased, the chlorophyll content of young and old laminae. Young leaves contained more chlorophyll than old (dry weight basis). The concentration in both decreased rapidly as the season progressed. (6) Increased potassium supply increased, while calcium carbonate decreased, soluble iron in old leaves (extracted by 0·1 N HCl and ether, or glycerophosphoric acid). (7) Increased iron supply decreased soluble potassium in young leaves and increased it in old leaves. (8) Increased potassium supply increased soluble and total potassium and decreased the phosphorus in old and young leaves. Total iron was increased in old leaves and calcium was usually reduced. (9) Calcium carbonate increased

soluble and total potassium and calcium, and soluble phosphorus in young leaves and decreased the total iron and phosphorus in old and young leaves. (10) Increased iron decreased the ratio of potassium in young to old leaves. Chlorophyll increased in old leaves as the young to old leaf ratio of total or soluble potassium increased. Chlorophyll in young leaves increased as the ratios of total iron to phosphorus or potassium increased. The soluble iron content of the old leaves increased in proportion to the total potassium content of the lamina. [From author's summary.]

3690. Scudder, W. T., Jacob, W. C., and Thompson, H. C.
Varietal susceptibility and the effect of potash on the incidence of black spot in potatoes.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 343-8, bibl. 14, being *Pap. Dep. Veg. Crops Cornell Univ.* **321.**

The internal discoloration of potatoes known as black spot has been a serious disorder in Long Island for the past 10 years. In experiments liberal dressings of K and Na have both independently reduced black spot significantly, but the improvement has been too small to be of much practical value. Trials with Ca, Mg, Mn, Zn, B, Mo, Ni, Co, Br and I have given negative results. Differences in varietal susceptibility, which are considerable, are indicated for 21 varieties.

3691. Steineck, O.
Untersuchungen über Bormangelerscheinungen bei Kartoffeln. **(A study of boron deficiency symptoms in potatoes.)**
Bodenkultur, 1951, **5**: 57-60, bibl. 4, illus.

Injured parts of potato tubers show dark to black discolorations due to enzymatic oxidation of the amino acid, tyrosine, to melanin. This tyrosinase activity is more pronounced in tubers grown on boron deficient land, and is induced by bruising, cutting or any other cell injury. Boric acid prevents tyrosinase activity and thereby the blackening of the tubers. Correlations between boron deficiency on one hand and black heart and tuber rot on the other are considered likely by the author, who bases his theory on the results obtained by other workers, his own supporting experiments being of a preliminary nature.

3692. Buzover, F. Ja.
The effect of boron on the accumulation of carbohydrates and on the enzymic activity in the potato. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **78**: 1239-42, bibl. 8.

In experiments with two varieties of potato on small field plots, spraying the plants with a 0·01% boron (as borax) increased the amount of sugars in the leaves and starch in the tubers, and the hydrolytic activity of invertase in leaves and tubers. In the variety Stahanovskiĭ the synthetic activity of invertase was about the same at the beginning and end of flowering, but hydrolytic activity was greater (about double) at the end of flowering than at the beginning. In the variety Voljtman synthetic activity was distinctly lower at the bud stage than at the beginning of flowering.

3693. Koteljnikova, A. V.
The effect of cultural conditions of potato on the activity of apyrase in tubers. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **78**: 945-8, bibl. 6.

An account of the part played by the enzyme apyrase in the physiological processes in potato tubers, in relation to NPK manuring.

3694. Rastegaeva, E. M., and Proničeva, L. L.
A wilting of potatoes in the Rostov province. [Russian.]
Sad i Ogorod, 1951, No. 4, pp. 64-9.

The chief cause of premature wilting of potatoes in the Rostov province is the air temperature, which reaches 34° C. and higher, during the flowering period. Fungi are not responsible for the wilting. Cultural methods for reducing the damage are " coulisse " cultivation (in avenues of taller plants), mulching, and planting the tubers deeper.

3695. Hampton, R. N., Murphy, R. G., and Hoff, P. R.
Potato irrigation: costs and practices in Suffolk County, New York, 1946.
Bull. Cornell agric. Exp. Stat. **862**, 1950, pp. 56, bibl. in text, illus.

The cost data presented in this study are based on records taken on 23 potato farms in Suffolk County, New York. On all these farms rotary-sprinkler or portable-pipe irrigation systems were used. To correlate the calculated costs of irrigation with expected gains, experimental yield data on potatoes grown at the Long Island Vegetable Research Farm have been compiled. Some engineering, economic and agronomic problems of farm irrigation are discussed. A method of calculating and distributing irrigation costs is described in an appendix.

Virus diseases.

(*See also* 3724c.)

3696. von Rümker, R.
Literaturbericht über Arbeiten zum Kartoffelabbau 1939-1949. **(Bibliography of potato degeneration 1939-1949.)**
Höfchen Briefe, 1951, **4**: 34-83, bibl. 274.

A review of the world literature on potato degeneration with special reference to virus diseases published in the years 1939-1949.

3697. Sprau, F.
Versuche zur hydroponischen Augensteck-lingsprüfung. **(Water-culture trials of potato sprouts.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 51-5.

An account is given of a water-culture method of sprouting potato eyes for the assessment of disease, particularly with regard to virus infection. Health or disease was determined by the vigour of the roots and the sprouts, together with any virus symptoms that appear. Details are given of the construction of the culture tanks (prepared from sheet zinc) and the method of using them.

3698. HAUSCHILD, I.
Zur Virusresistenzzüchtung bei der Kartoffel. Der Einfluss der Resistenz auf Virusbefall und Ertrag. **(Breeding for virus resistance in potatoes. The effect of resistance on virus incidence and yield.)**
Züchter, 1950, **20**: 306-11, bibl. 5.
In potatoes virus resistance and tolerance are genetically determined properties. The breeder should aim at a combination of strong resistance to infection with low tolerance, which leads automatically to the elimination of diseased plants and thus slows down the spread of the virus. This is preferable to a combination of the same degree of resistance with high tolerance, although better yields are obtained from tolerant varieties. The problem is discussed in mathematical terms.

3699. SCHULTZ, E. S.
Interveinal mosaic of potato.
Abstr. in *Phytopathology*, 1951, **41**: 564-5.
Interveinal mosaic of potato is characterized by diffuse light-green areas between the main veins of leaves in Green Mountain, Irish Cobbler, and similarly reacting varieties. On some varieties the virus induces distinct rugosity of leaves, but no mottling. It is aphid-transmissible. Though it may not perceptibly reduce the size of affected plants this disease has reduced the total yield of tubers, by weight, in Green Mountain 13%, in Irish Cobbler 18%, and in 41956, a variety immune from virus X, 14%.

3700. BODE, O.
Über den Gehalt an Blattfarbstoffen in gesunden und blattrollkranken Kartoffelpflanzen. **(The pigment content of healthy and leafroll-infected potato plants.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 64-8, bibl. 6.
The loss of pigment in virus-infected plants is discussed and data are tabulated showing that the chlorophyll content of healthy potato plants increases from the end of June for about 14 days and then decreases; in virus-infected plants the chlorophyll content is not only less than in healthy plants throughout the season but also diminishes from the end of June onwards. The carotinoid content also is less in infected than in healthy plants; on the average it increases for 14 days from the end of June and then decreases in both healthy and infected plants.

3701. BERCKS, R.
Infektionsversuche mit dem X-virus an Kartoffelpflanzen. **(Infection trials with X-virus on potato plants.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 61-4.
In inoculation experiments carried out on 27th May and on 5th July on varieties Flava and Capella using virus X from other varieties, it was found that the earlier inoculations gave a higher number of infections than the later ones. In manurial experiments, with reference to infection, the results, though masked by deficiency symptoms, indicated that, in ill-nourished plants, the infection and its spread were checked.

3702. KLINKOWSKI, M.
Zur Frage der Ertragsbeeinflussung und der Möglichkeit der "Bodeninfektion" des X-Virus der Kartoffel. **(The effect on yield and the possibility of "soil infection" of the X-virus of potato.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 59-61.
The evidence for contact infection of foliage and of roots by X-virus disease of potatoes is discussed with notes on the author's own observations.

3703. BERCKS, R.
Infektionsversuche mit verschiedenen X-Virusherkünften an mehreren Kartoffelsorten. **(Infection experiments with various virus-X strains on numerous potato varieties.)**
Züchter, 1950, **20**: 282-7, bibl. 9.
A paper, somewhat expanded and giving more data, but in essence confirming results published in an earlier, preliminary communication [see *H.A.*, 20: 1752].

Fungous diseases.

(*See also* 3724a, i.)

3704. BRAUN, H.
Über den augenblicklichen Stand des Alternaria-Problems. **(The alternaria problem.)**
Mitt. biol. Zentralanst. Berlin-Dahlem, Hft **70**, 1951, pp. 47-50.
Alternaria solani not only causes a leaf blight of potatoes but is responsible also for a tuber rot in storage. Injury is not necessary for infection. Early varieties are more susceptible than late ones, and smooth skinned tubers than rough skinned. A comparison is made of alternaria and fusarium rots.

3705. NATTRASS, R. M., AND RYAN, M.
New hosts of *Phytophthora infestans* in Kenya.
Nature, 1951, **168**: 85-6, bibl. 1.
Although the potato has been grown in Kenya for over 50 years under conditions favourable to blight, the disease did not appear until 1941. Varieties immune to biotypes A and C successfully replaced the old varieties, but the appearance of a new biotype, E, in 1948 broke down blight resistance. In 1950 the foliage of the following indigenous woody *Solanum* spp. was found to be attacked by the fungus: *S. indicum*, *S. incanum* and a species near to *S. panduroeforme*. It is feared that these hosts may give rise to yet more aggressive strains of *Phytophthora infestans*.

3706. MUNCIE, J. H., AND HATFIELD, M. R.
Field experiments on the control of potato late blight.
Quart. Bull. Mich. agric. Exp. Stat., 1951, **33**: 332-6, being *Contr. Dep. Bot. and Plant Path.* **51-5.**
In spraying trials in Michigan carbamates (Thiodow and Dithane D-14), fixed coppers (Cop-o-zinc, Tribasic Copper Sulphate, Crag 658 and Copper A) and two experimental compounds, 1189 and 1124, controlled late blight and gave good yield returns. Bordeaux mixture gave good blight control but in some cases

reduced yields. In dusting experiments the fixed coppers permitted higher yields than did carbamate Z-78 or the experimental compound 1189, a thiocyanate.

3707. Richter, H., and Schneider, R.
Rhizoctonia-Schäden an Stolonen, Wurzeln und Knollenanlagen der Kartoffel. **(Rhizoctonia infection of potato stolons, roots and tuber initials.)**
Phytopath. Z., 1951, **17**: 374-83, bibl. 5, illus.

A study was made of the injury caused by *Rhizoctonia solani* to potatoes by inoculating the eyes of seed tubers of 4 varieties on planting, and noting the effect on the resulting plants. The degree of injury to the haulms, roots and stolons, and the loss in weight and numbers of tubers, are tabulated. The greatest injury induced was that on the stolons.

3708. Richter, H., and Schneider, R.
Untersuchungen zur *Rhizoctonia*-Anfälligkeit der Kartoffelsorten. **(*Rhizoctonia* susceptibility of potato varieties.)**
Züchter, 1950, **20**: 257-67, bibl. 15, illus.

Comparative laboratory and field trials conducted at Berlin-Dahlem have shown that, while the degree of infection varied, all varieties tested were susceptible. A number of them, particularly Erstling and Voran, were strongly susceptible in the laboratory but appeared resistant in the field. This field resistance is attributed to environmental factors and is to be further studied.

3709. Grečušnikov, A. I., and Jakovleva, N. N.
The changes in peroxidase activity in potato varieties resistant and susceptible to potato wart disease in the process of infection by *Synchytrium endobioticum* Schilb (Perc.). [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 207-8, bibl. 9.

Determinations for the degree of peroxidase activity were made on the sprouts of two resistant and two susceptible potato varieties 12 hours after inoculating the sprouts with spores of *Synchytrium endobioticum*. It was found that the increase in peroxidase activity was definitely higher in the resistant varieties, and it is suggested that this reaction is a protection against infection.

3710. Grečušnikov, A. I., and Jakovleva, N. N.
Carbohydrate exchange in potato wart disease. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **76**: 303-4, bibl. 2.

The potato wart disease organism alters the carbohydrate exchange of infected tubers; in these there is less insoluble carbohydrate (starch) and more soluble sugar (glucose) and also more free acid than in healthy tubers.

3711. Andrade, A. C.
Novos fungicidas para controlar doenças da batatinha e tomateiro. **(New fungicides for the control of potato and tomato diseases.)**
Biológico, 1951, **17**: 75-6.

Three large-scale comparative trials of the main commercial fungicides were carried out in potato fields in Brazil. Parzate (ethylene-bis dithiocarbamate of zinc) controlled potato blight as effectively as bordeaux mixture and resulted in 10-20% higher production. The addition of the insecticide, Rhodiatox, to Parzate increased production by 10-32%; no increase was observed when Rhodiatox was added to bordeaux. Numerous trials on tomatoes have shown that Phygon XL (2,3,-dichloro-1,4,-naphthoquinone) will satisfactorily control blight and defoliating diseases. Parzate controls blight but is not so effective as bordeaux mixture in control of septoria leafspot.

3712. Heuberger, J. W.
Eight years of Dithane *vs.* copper on potatoes in Delaware.
Abstr. in *Phytopathology*, 1951, **41**: 561-2.

In these trials the percentage increase in yield over untreated was: bordeaux mixture, 44; fixed copper, 34; Dithane, 72, figures which show the superiority of Dithane over copper sprays for the control of early and late blights of potato.

Insect pests.

(*See also* 3724b, f, h.)

3713. Boczkowska, M.
Les pommes de terre résistantes au doryphore. **(Potatoes resistant to colorado beetle.)**
Rev. hort. Paris, 1951, **123**: 454-5, bibl. 9, illus.

Recent work on the production of resistant hybrids is reviewed. *Solanum demissum* shows great resistance to colorado beetle attack but this quality is rapidly lost in its hybrids. At the Institut für Züchtungsforschung, Rosenhof, the species *S. chacoense* and *S. polyadenium* have been used to impart resistance with considerable success, and the problem now is to develop hybrids of commercial value. It has been found that resistance is due to the presence of toxic alkaloids.

3714. Langenbuch, R.
Beitrag zur Klärung der Ursache der Kartoffelkäferresistenz der Wildkartoffel (*Solanum polyadenium* Greenm.). **(A note on the Colorado beetle resistance of the wild potato (*Solanum polyadenium*).**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1951, **3**: 69-71, bibl. 8, illus.

The resistance of *Solanum polyadenium* to Colorado beetle attack is due to the repellant action of a bitter substance found in the leaf tissues. It is not destroyed by boiling or by ether and is not identical with the glandular hair secretion which adheres to the leaf surface.

3715. Prokošev, S. M., and Petročenko, E. I.
The nature of the glucoalkaloids of certain wild species of potato. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **74**: 541-4, bibl. 5.

Data are given on the distribution of the chief types of glucoalkaloids—solanin and demissin—in leaves and tubers of wild species of potato. They indicate that the nature of resistance to Colorado beetle shown by

species of the Commersonii group is different from that of *Solanum demissum*.

3716. Leib, E.
Beitrag zur "Überwinterung des Kartoffelkäfers (*Leptinotarsa decemlineata* Say) und sein Erscheinen im Frühjahr in seinen Beziehungen zu meteorologischen Faktoren". **(A note on the hibernation of the Colorado beetle and its emergence in the spring in relation to climatic factors.)**
NachrBl., dtsch. PflSchDienst., Braunschweig, 1951, **3**: 42-4, bibl. 5.

In the Saar in sandy loam a temperature of 14·7° C. at the depth of 50 cm. which is reached between 16 and 25 May, is considered to be critical for the mass emergence of Colorado beetles. Observations in general support those made at Darmstadt [see *H.A.*, 21: 1778], though there the critical temperature was 16·6° C. The difference is attributed to different soil conditions, mainly high moisture content of the Saar soil, the trial plot being only 600 m. from the river bed.

3717. Helson, G. A. H.
The potato moth *Gnorimoschema operculella* (Zell.) and its control in Australia.
Bull. Coun. sci. industr. Res. Aust. **248**, 1949, pp. 27, bibl. 17.

Investigations covered the period 1942-46. Differences in varietal susceptibility were shown. Of 15 mineral dusts compared as insecticides in the stored tubers with magnesite, ferric oxide proved the best. Not one of 29 other materials tested in the laboratory as dusts proved effective in the field. The most useful dusts were derris, synthetic cryolite, finely ground seeds of yam bean and DDT. DDT was the most effective insecticide irrespective of mode of application. Actually in the field a dust containing 2% DDT was the most practical method of control. Three applications of such a dust at intervals of 3 weeks gave complete and economical protection to late crop potatoes on experimental plots at Crookwell, New South Wales. [From author's summary.]

3718. Boock, O. J., and Caron, A. G.
O controle de *Pseudococcus maritimus* em tubérculos-semente de batatinha, com "Rhodiatox". **(Control of *Pseudococcus maritimus* in seed potato tubers with Rhodiatox.)**
Rev. Agric. Piracicaba, 1950, **25**: 397-404, bibl. 2, illus.

Pseudococcus maritimus, which caused serious damage to stored seed potatoes in Brazil, was successfully controlled by dusting the tubers with 0·5% Rhodiatox (containing diethylparanitrophenyl thiophosphate). The most satisfactory dose was 300 g. Rhodiatox to 70 Kg. tubers. Treated tubers must not be used for consumption.—Inst. agron., Campinas.

3719. Bishopp, F. C.
Agricultural crop yields gain tremendously through use of pesticides.
Agric. Chemls, 1951, **6**: 7: 46-8, 105, 107.

Includes figures on the effect of large-scale insecticide applications on potato, tomato and pea production in certain areas of the United States.

Storage.

(*See also* 3193.)

3720. Bouchard, R. J. A., and Perry, A. L.
The development of external defects in Maine potatoes at retail stores in Boston, Massachusetts, February and March, 1950.
Bull. Me agric. Exp. Stat. **486**, 1950, pp. 24, bibl. 5.

The total external defects in Maine potatoes increased 57% from the time of arrival at the retail store to the time of sale. This increase was due one-third to handling and two-thirds to time effects. 5 lb. packages arrived in the best condition. Potatoes rehandled through the wholesale markets averaged 5·15% external grade defects, as compared with 3·58% for potatoes delivered to the stores direct. The Green Mountain variety had a larger percentage of cuts and bruises and total external grade defects on arrival at the stores than the Katahdin-Chippewa type.

3721. Barker, J., and Mapson, L. W.
The ascorbic acid content of potato tubers. II. The influence of the temperature of storage.
New Phytol., 1950, **49**: 283-303, bibl. 30.

Previous work is confirmed which shows that there is a more rapid loss of ascorbic acid in potatoes transferred to low temperatures than in tubers held at 10° C., but that this decrease in ascorbic acid is preceded by an initial increase at low temperatures. There is also a complicated relationship between the changes in ascorbic acid content, the temperature, the developmental state of the tubers and the development of physiological breakdown. With potatoes previously stored for some months at 10° C. there was an increase in ascorbic acid when the temperature was raised to 25° C.—Cambridge Univ.

3722. Petročenko, E. I.
The dynamics of vitamin C during the storage of potatoes. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **78**: 953-4, bibl. 4.

It is shown that during storage the vitamin content of potato tubers decreases by about 50% from October to February.

3723. Smith, W. L., Jr.
Effect of initial storage temperature on weight loss, decay, and surface browning of new potatoes.
Abstr. in *Phytopathology*, 1951, **41**: 565.

Using initial temperatures of 40°, 50°, and 70° F., no consistent difference in total weight loss was found at the end of two weeks.

Noted.

3724.
a Boncompagni, T., Scotti, T., and Lorenzini, C.
Prove di lotta contro il *Synchytrium endobioticum* con l'impiego di razze di patate resistenti. **(Experiments on the control of *Synchytrium endobioticum* by the use of resistant varieties of potato.)** [English summary 5 lines.]
Not. Mal. Piante, 1951, No. 14, pp. 64-87.
Successful.

b HENDERSON, V. E.
Some host relationships of the potato-rot nematode, *Ditylenchus destructor* Thorne, 1945.
Nature, 1951, **167**: 952, bibl. 6.

c DE MONTGREMIER, H. A.
La dissémination du virus X (*Marmor dubium* (Orton) Holmes) dans les cultures de pommes de terre. . . . **(The dissemination of virus X in potato cultures. The effect of cutting the tubers.)***
Ann. Épiphyt., 1950, **1**: 38-47, bibl. 20.

d PLOPER, J.
Panorama del cultivo de papa en la provincia y sus perspectivas para 1951. **(A survey of potato production in Tucumán, and prospects for 1951.)**
Circ. Estac. exp. agríc. Tucumán **146,** 1951, pp. 7.

e SÉLARIÈS, P.
Sensibilité des différentes variétés de pommes de terre à la maladie verruqueuse (*Synchytrium endobioticum* [Schilb.] Perc.).

* For abstract of same article published elsewhere see *H.A.*, 20: 907.

(Varietal susceptibility of potato varieties to wart disease.)
Ann. Épiphyt., 1948, **14**: 103-9, bibl. 22, illus. [received 1951].

f SMALL, T.
Colorado beetle in Jersey: 1949 and 1950.
Agriculture, Lond., 1951, **57**: 582-6.

g SWAMINATHAN, M. S.
Einige Verfahren für die Verwendung wilder *Solanum*-Arten zu Zuchtzwecken. **(Some notes on the technique of using wild *Solanum* spp. in potato breeding.)**
Züchter, 1950, **20**: 358-60, bibl. 12, illus.

h THOMAS, I., AND DUNN, E.
Colorado beetle in England, 1950.
Agriculture, Lond., 1951, **58**: 135-9.

i VINOT, M., AND BERNAUX, P.
La pourriture charbonneuse de la pomme de terre dans la région méditerranéenne (*Macrophomina phaseoli* [Maublanc] Ashby). **(The charcoal rot of potatoes in the Mediterranean region.)**
Ann. Épiphyt., 1948, **14**: 91-102, bibl. 25, illus. [received 1951].

TOBACCO.

Varieties and breeding.

(*See also* 3674c, 3762f, 4142, 4147.)

3725. AGRONOMY DEPARTMENT VIRGINIA POLYTECHNIC INSTITUTE.
Official Virginia varietal tests 1950. Field crop recommendations for 1951.
Bull. Va agric. Exp. Stat. **445,** 1951, pp. 18.
Tobacco is among the crops included in these tests. The Vesta varieties or Dixie Bright Leaf 101 are recommended for soil infested with the blackshank organism, and Dixie Bright Leaf 101 or Oxford 26 for soil infested with the Granville wilt organism. Yield and value per acre of the other varieties tested are tabulated.

3726. PEENS, J. F.
Tobacco varieties, seed supply and seed selection.
Fmg S. Afr., 1951, **26**: 133-4.
Notes are given on varieties grown in South Africa for producing snuff, roll, pipe, Orinoco and cigar tobaccos. The varieties, seed of which is available at the Central Tobacco Research Station, Rustenburg, are listed. Hints are provided on the selection of plants and the production of healthy seed.

3727. SHULKCUM, E., AND OTHERS.
The 1949 official Virginia varietal tests of corn hybrids, barley, oats, wheat, soybeans, peanuts and tobacco.
Bull. Va agric. Exp. Stat. **432,** 1950, pp. 32.
Under the heading "Tobacco tests at Chatham" (pp. 28-30) descriptions are given of 8 recommended tobacco varieties, and yields and values obtained in trials, some for 3 years, are tabulated for 20 varieties.

3728. POLJAKOV, I. M.
The mutual effect of the pollen in "stored" pollen mixtures and the physiological basis for it. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 199-202.
The selectiveness of the two kinds of pollen, in a mixture used in pollinating for hybridization trials in tobacco, was altered when the pollens were mixed 12 days prior to applying them. The possible mutual effect of the pollen emanations during keeping is discussed.

3729. MIHAĬLOVA, P. V.
Overcoming fertilization difficulties in crossing by the use of pollen mixtures in the interspecific hybridization of tobaccos. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 195-8, bibl. 5.
Data are tabulated to show that, in interspecific crosses in tobacco, fertilization can be induced or increased by using a mixture of the pollen of both the species used in the cross.

3730. FEINSTEIN, L., HANNAN, P. J., AND MCCABE, E. T.
Extraction of alkaloids from tree tobacco.
Industr. Engng Chem., 1951, **43**: 1402-3, bibl. 12.
Tree tobacco, *Nicotiana glauca*, is an important source of the alkaloid anabasine which is 4-5 times as toxic as nicotine to certain aphids of economic importance. It is a fast-growing plant, occurring wild in the United States. The cultivation of selected strains and the hybridization of *N. glauca* and *N. rustica* are envisaged.

—Bureau of Entomology and Plant Quarantine, Beltsville.

Cultivation and nutrition.

(*See also* 3180, 3211, 3213, 3218.)

3731. ANON.
La culture du tabac au Moçambique. (Tobacco growing in Mozambique.)
Rev. int. Tabacs, 1950, **25**: 38-9, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 241.
Virginia tobacco has been grown extensively in Mozambique only during the last few years. Methods of culture, construction of curing sheds and control of pests and diseases are dealt with.

3732. COLLINS, J. C.
The production of fire cured tobacco [in Southern Rhodesia].
Rhod. agric. J., 1950, **47**: 494-509, bibl. 1.
In 1949, a year of normal rainfall, a detailed study was made of methods employed by growers of fire-cured tobacco in S. Rhodesia [see *H.A.* 20: 1775]. In 1950 the survey was repeated for a crop grown under severe drought conditions. Based on the results obtained in these two contrasting years the methods of cultivation and curing which appear to be most satisfactory are described under the following headings: soil, altitude and rainfall, crop rotation, spacing, manurial treatment, field routine, priming and topping, seed selection, harvesting, curing by 3 methods, grading, presentation for sale, and classification.

3733. SCHNEIDER, E. O., AND BEACH, W. S.
Practices used on tobacco seedbeds.
Progr. Rep. Pa agric. Exp. Stat. **48**, 1951, pp. 3.
Experiments at the Tobacco Research Laboratory, Lancaster, indicate that the following practices conduce to healthy growth of tobacco seedlings: (1) Delay in seeding till both soil and air temperatures are warm enough, (2) thorough soil steaming, (3) boiling old tobacco muslin for 1 hour, (4) provision of a firm, porous soil surface with high water-holding capacity, (5) use of 1 oz. clean seed per 1,200 sq. ft. of bed, (6) maintenance of sufficient moisture in beds during germination, (7) use of glass or plastic screen sash, (8) prevention of disease by watchfulness and seed bed sprays. A note is made of sprays used and spraying procedure and of fertilizer application and materials.

3734. ANON.
La machine à planter. ([Tobacco] planting machine.)
Rev. int. Tabacs, 1950, **25**: 42, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 241.
An American planting machine for tobacco, capable of setting out 2,000 plants an hour, is described.

3735. BYNOV, F. A.
The effect of topping and removing the side shoots on the formation of nicotine in *Nicotiana rustica*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 833-6, bibl. 5.
In trials involving topping the stems and removing the side shoots in *Nicotiana rustica*, these operations separately and together increased the nicotine content of the leaves.

3736. MCILVAINE, T. C., AND POHLMAN, G. G.
Crop growth and soil reaction.
Bull. W. Va agric. Exp. Stat. **337**, 1949, pp. 18, bibl. 7, illus. [received 1951].
All trials but one were on strictly agricultural crops, tobacco being the exception. Tobacco (Burley type) was planted in fine sandy loam soil treated either with H_2SO_4 or aluminium sulphate. In general the yield increases show a smooth curve with the highest yield at pH 7·2, the differences above pH 5·6, however, not being significant.

3737. MIDDELBURG, H. A.
Het tabaksgrond systeem in de tropen. (Soil effects on tobacco in the tropics.)
Bergcultures, 1950, **19**: 315-25, bibl. 20.
A chemical interpretation is given of some effects of soil conditions on the hygroscopicity and burning quality of tobacco.

3738. BURNS, R. E.
Composition, structure, and ontogeny of cortex and pith of tobacco stem in relation to potassium and nitrogen deficiency.
Amer. J. Bot., 1951, **38**: 310-17, bibl. 21.
The chemical, structural and growth differences at various stages of development were studied in the pith and cortex of the basal half of the stem of Little Turkish tobacco. The plants studied were grown in complete nutrient solutions (control plants) and K- or N-deficient gravel cultures. In the control plants the cross sectional area of the pith and cortex reached a maximum before that of the stem as a whole. Large pith area was associated with an abundance of carbohydrates. The pith diminished both in cross sectional area and number of cells present during late ontogeny. K and N deficiencies caused modifications of this ontogenetic pattern. The correlation between carbohydrates and parenchyma area was more evident in the low K plants but was absent in the low N plants. In the low N plants, the cortex contained a lower percentage of carbohydrates and the pith a higher percentage than the control plants. The change in water content of the plants, normally occurring at flower initiation, can be inhibited by lack of N or K, which indicates that this change is not a cause of flower initiation.—Georgia Exp. Stat.

3739. SWANBACK, T. R.
Ammonium nitrate and poultry manure in fertilization of tobacco.
Bull. Conn. agric. Exp. Stat. **546**, 1951, pp. 26.
Ammonium nitrate was compared with cottonseed meal as a nitrogenous fertilizer for Havana Seed tobacco in an experiment carried out over a period of 5 years. When ammonium nitrate was used as the only source of N, an application of 175 lb. N per acre resulted in nearly the same crop value as an application of 200 lb. N per acre in the form of cottonseed meal. Under favourable conditions, when little leaching occurred, the same results were obtained with 150 lb. N per acre in the form of ammonium nitrate. Applications of more than 175 lb. N per acre as ammonium nitrate resulted in a slight reduction in crop value. The best yields and grading, however, were obtained when a

complete 5-4-8 fertilizer, containing cottonseed meal, was supplemented with a side dressing of ammonium nitrate. In another experiment, poultry manure was compared with the standard 6-3-6 commercial fertilizer for use on stalk-cut tobacco. The results indicated that the application of manure and fertilizer in equal proportions was better than the application of fertilizer alone. Litter-mixed manure was almost as valuable as manure from the dropping boards. There was little difference, as regards crop value, between ploughing under and harrowing in the manure, but ploughing under resulted in rather better leaf burn. When poultry manure is used, supplementary applications of K are required.

3740. Naezer, H. W.
Tabaksas als kali-meststof. (Tobacco ash as a potash fertilizer.)
Bergcultures, 1950, **19**: 295-6.

The ash of tobacco stalks, collected and burnt immediately after the harvest, has a very variable potash content, in practice rarely exceeding 20% K_2O. Although the ash contains other valuable fertilizer elements, and it is advantageous to destroy the stalks in this manner, there are many objections to its use as a fertilizer, including its variable composition, its high chlorine content and its cost. The use of rubber ash, however, a factory by-product with a low chlorine content, is recommended.

3741. Bacon, C. W., Leighty, W. R., and Bullock, J. F.
Boron, copper, manganese, and zinc requirement tests of tobacco.
Tech. Bull. U.S. Dep. Agric. **1009**, 1950, pp. 27, bibl. 25.

Two series of plot experiments were carried out on a uniform fine sandy loam to test the effects of application of boron, copper, zinc and manganese on yield and quality of tobacco. Boron was applied at the rates of 0·5, 1·0 and 2·5 lb./acre; copper and zinc at 1, 2 and 5 lb./acre; manganese at 2, 4 and 10 lb./acre. In the first series (1940-43) a complete fertilizer containing 48 lb./acre of potash was applied, while in the second series (1944-45) the potash supplied was increased to 80 lb./acre. In the first series no yield increase resulted from the applications of trace elements, and the higher applications of boron, copper and zinc reduced yields. With the higher potash applications in the second series, however, increased yields were obtained from the low applications of boron and copper and to a lesser extent from low applications of manganese. No significant differences of quality due to trace elements were found. As a result of analyses of tobacco plants it was considered that, for normal healthy plants, the minimum requirements of zinc and boron are less than 10 p.p.m. and of copper about 10 p.p.m. Manganese deficient plants had 22 p.p.m. of manganese, but field samples of normal plants contained 72 p.p.m. C.W.S.H.

3742. de Querquis, F.
Direttive per una razionale concimazione chimica al tabacco orientale nel Salento. (Advice on the rational application of chemical fertilizers for Turkish tobacco at Salento.)
[*Publ.*] *Ist. sci. sper. Tabac.* **14**, 1951, pp. 7.

This is a general account of the soil and weather conditions of the tobacco growing areas of Salento (Lecce province, south-east Italy) and of their manurial requirements with particular reference to applications of calcium cyanamide, ammonium sulphate and ammonium phosphate.

Composition.

(*See also* 3762d.)

3743. Axelrod, B., and Jagendorf, A. T.
The fate of phosphatase, invertase, and peroxidase in autolyzing leaves.
Plant Physiol., 1951, **26**: 406-10, bibl. 5, being *Contr. Enzyme Res. Div.* **133.**

As part of a project concerned with the chemical and physical identification of the storage labile proteins of tobacco leaves, the survival of enzymes in the autolysing leaf was compared with that of total soluble cytoplasmic protein. Although the amount of soluble cytoplasmic protein decreased by about 45% during 7 days of storage, there was little change in the contents of phosphatase, invertase and peroxidase.—Calif. Inst. Technol., Pasadena.

3744. Aniščenko, N. F., and Volodurskiĭ, N. I.
The changes which take place in the dry matter content of tobacco leaves during growth. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 589-92, bibl. 7.

The dry matter content of tobacco leaves gradually increases with the age of the leaves, and reaches a maximum just after the plant is fully grown. It remains at this level for some time (up to 15 days) and begins to decrease as the leaves turn yellow.

Virus diseases.

(*See also* 3762b, c, g, h, 3966.)

3745. Bawden, F. C., and Nixon, H. L.
The application of electron microscopy to the study of plant viruses in unpurified plant extracts.
J. gen. Microbiol., 1951, **5**: 104-9, bibl. 16, illus.

Rods of variable lengths occurred in sap from plants infected with tobacco mosaic, cucumber mosaic, potato X, potato Y, henbane mosaic, tobacco etch, and cabbage black ring viruses. No specific particles were identified in sap from plants infected with tomato spotted wilt, potato leaf roll, cauliflower mosaic, tomato aspermy, sugar beet mosaic and sugar beet yellows viruses.—Rothamsted exp. Stat.

3746. Walters, H. J.
Grasshopper transmission of three plant viruses.
Science, 1951, **113**: 36-7, bibl. 7, being *Pap. J. Ser. Neb. agric. Exp. Stat.* **502.**

Greenhouse experiments have shown that the differential grasshopper, *Melanoplus differentialis* (Thos.), can transmit tobacco mosaic virus, potato virus X and tobacco ringspot virus from tobacco to tobacco.

3747. MATTHEWS, R. E. F.
Effect of some substituted purines on the development of plant virus infections.
Nature, 1951, **167**: 892-3, bibl. 4.

The effect of 5-amino-7-hydroxy-1-V-triazolo (D) pyramidine (guanazolo) on the spread of lucerne mosaic virus in tobacco plants was chiefly studied. In one experiment in which tobacco was inoculated with virus at a dilution of 1: 1, control plants developed 1,268 local lesions and all six plants were infected systemically after five days. Plants sprayed thrice weekly with a 0·1% suspension of guanazolo both before and after inoculation developed no local lesions, and after twenty-three days, when the experiment was terminated, no systemic symptoms had appeared. In check inoculations no virus was recovered from the top leaves of any of these plants. Guanazolo watered on the soil before plants were inoculated gave about the same degree of suppression of systemic symptoms, but reduction in numbers of local lesions was not so marked as that obtained when the compound was sprayed on the leaves. With both cucumber mosaic virus in cucumber and pea mosaic virus in peas, guanazolo sprayed on the leaves delayed considerably the development of systemic infection when plants were infected by mechanical inoculation, but had no effect when the virus was transmitted by *Myzus persicae*. With tomato spotted-wilt virus in tomato and *N. glutinosa* and with potato virus X in tobacco, guanazolo had no effect. With an *aucuba* strain of tobacco mosaic in tomato, guanazolo had a delaying effect on the systemic spread of the virus. [From author's summary.]—D.S.I.R., Auckland, New Zealand.

3748. MORGAN, O. D., AND MCKINNEY, H. H.
A disease of Maryland broadleaf tobacco with symptoms similar to leaf curl symptoms.
Abstr. in *Phytopathology*, 1951, **41**: 564.

The disease mentioned causes stunting and shortening of leaf internodes, which give a rosette appearance to the most severely affected plants. Individual leaves are somewhat thick, succulent and brittle. The leaf edges and leaf tip are generally rolled downward and inward toward the lower surface. The midrib and lateral veins are sometimes knotty and crooked, and many affected leaves have a corkscrewlike twist to the midrib. The disease has been transmitted through grafts.

3749. STOVER, R. H.
Tobacco etch virus in Ontario.
Canad. J. Bot., 1951, **29**: 235-45, bibl. 19, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa*, **1088.**

Tobacco etch is one of the most widespread and injurious viruses on burley tobacco in Ontario. Three strains of this virus were obtained from tobacco collections. Their symptoms and behaviour on tobacco and other hosts are described. Tobacco varieties were divided into two groups on the basis of their reaction to the etch virus. The group comprising all burley varieties tested showed severe symptoms while the other, comprising flue-cured, dark and cigar varieties, developed mild symptoms. The widespread occurrence of etch is attributed to the prevalence on tobacco of the vector *Myzus persicae*. A mixture of potato virus X (ringspot strain) and etch causes a more severe disease of burley tobacco than either virus by itself. [From author's abstract.]

3750. LIMASSET, P., AND DE MONTGREMIER, H. A.
Sur une maladie à virus provoquant des déformations foliaires remarquables chez le tabac et la tomate. **(A virus disease causing strange foliar malformations in tobacco and tomato.)**
Ann. Épiphyt., 1946, **12**: 181-202, bibl. 23, illus. [received 1951].

The authors describe malformations of tobacco and tomato leaves caused by infections with mixed viruses.

3751. KÖHLER, E.
Untersuchungen zur Prämunitätsfrage. I. Das Vordringen von Virus aus der Sprossachse in das prämune Blatt im Pfropfversuch. **(The pre-immunity question. I. The extension of virus from the shoot axis into pre-immunized leaves in grafting experiments.)**
Phytopath. Z., 1951, **17**: 462-7, bibl. 10.

The upper ends of tobacco plants which had previously been infected with the ordinary tobacco mosaic virus (TMV) were grafted on to other tobacco plants that were infected, before or after grafting, with para-tobacco virus (PTMV, a variant of TMV). When leaves of the scion were tested (by sap inoculation on White Burley tobacco plants) for the presence of PTMV, it was found that it had entered the petioles and midribs but not the other leaf tissues. This suggests that the TMV prevented the extension of PTMV into the portions outside the midrib.

3752. ALCARAZ MIRA, E.
Variedades de tabaco resistentes al mosaico ordinario. II. Nuevas variedades obtenidas. **(Tobacco varieties resistant to ordinary mosaic. II. New varieties obtained.)**
[English summary ½ p.]
Bol. Inst. Invest. Agron. Madrid, 1949, **10**: 9-47, bibl. 23, illus.

A genetical analysis was made of the resistant factors in hybrid tobacco plants obtained from crosses chiefly involving the variety Ambalema.

Bacterial diseases.

3753. GIGANTE, R.
La bruciatura nei semenzai di tabacco. **(Wildfire in tobacco seedling plots.)**
[*Publ.*] *Ist. sci. sper. Tabac.* **15**, 1951, pp. 5.

Wildfire [*Bacterium tabacum*] is reported as occurring in tobacco seed beds and in the open field at Salento [see abstract 3742 above]. In the seed beds the disease is in two forms, a rot of the young leaves which spreads to the whole plant, or yellow circular spots on the older leaves. Control measures are discussed under: wind-screens, avoiding excessive nitrogen fertilizing, aeration, the use of seed from disease-free crops, the disinfection of the woodwork, glass and covering material, and the application of bordeaux mixture.

Fungous diseases.

3754. Vidali, A., and Ciferri, R.
Esperienze di lotta contro l'oidio del tabacco (*Erysiphe cichoracearum*) a mezzo di tiosolfato e sali di litio. **(Experiments on the control of tobacco powdery mildew (*Erysiphe cichoracearum*).)** [English summary 4 lines.]
Not. Mal. Piante, 1951, No. 14, pp. 33-44, bibl. 16.

The application of sodium thiosulphate to the soil or by spraying to the plants had no effect on the mildew. The irrigation of tobacco plants with saturated and half saturated lithium carbonate water solutions reduced and delayed the development of mildew.

3755. Stover, R. H., and Koch, L. W.
The epidemiology of blue mold of tobacco and its relation to the incidence of the disease in Ontario.
Sci. Agric., 1951, **31**: 225-52, bibl. 29.

Peronospora tabacina, blue mould of tobacco, first appeared in 1921 in Florida and Georgia. It disappeared for ten years but reappeared in 1931 and gradually spread north, reaching Canada in 1938. Outbreaks were at first sporadic in Ontario, but in 1945 and 1946 epidemics occurred. Since then the disease has been less prevalent, though it was epidemic in two counties in 1947. In the epidemic years temperatures were lower, sunshine less, humidity higher and the disease appeared earlier than in other years. The two sources of inoculum are wind-borne spores from the south and overwintering fungus. Though overwintering has been the source of certain outbreaks, there is strong evidence that epidemics were due to heavy spore showers from Ohio and Kentucky. When the appearance of these spore showers coincides with suitable atmospheric conditions epidemics occur. Kentucky outbreaks occur at the end of April and beginning of May. Ontario outbreaks do not occur till mid-May, and transplanting is complete by 30 June. It is concluded that, if an appraisal is made each year of the Kentucky–Ohio incidence and the weather conditions, warning could be given to Ontario growers who would then apply seedbed sprays every 7 to 10 days during the critical period. C.W.S.H.

Insect and other pests.

(*See also* 3762e.)

3756. Vayssière, P.
Au Cameroun et à Sumatra. **([Tobacco pest control] in the Cameroons and in Sumatra.)**
Rev. Tabacs, 1950, **25**: 37-9, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 647.

Methods of pest control on wrapper tobacco in the Cameroons and in Sumatra are compared.

3757. Anon.
Green peach aphis control in flue cured tobacco.
Mimeo. Pap. Ga Coastal Plain Exp. Stat. **53**, 1948, pp. 2 [received 1951].

The green peach aphid [*H.A.*, 19: 3265-6], which attacks both tobacco beds and fields, can be successfully controlled with TEPP spray, all tested liquid brands of which proved satisfactory in 1948 when used at proper strengths. The materials caused no visible injury to flue-cured tobacco and left no poisonous residue on the cured leaf. Sprays were more satisfactory than dusts. Parathion is also recommended.

3758. Feinstein, L., and Hannan, P. J.
Effect of green peach aphid damage on the nicotine content of tobacco.
J. econ. Ent., 1951, **44**: 267.

Aphid-damaged samples of tobacco consistently showed less nicotine than the comparable undamaged ones, although in a few instances the difference was so slight as to be within the limits of error of the analytical method.

3759. Ciferri, R., and Bertossi, F.
Efficacia nematicida ed anticrittogamica del "parathion". **(The nematicidal and fungicidal effect of parathion.)** [English summary 11 lines.]
Not. Mal. Piante, 1950, No. 12, pp. 59-64, bibl. 4.

The fungicidal (or fungistatic) effect of parathion against *Pythium debaryanum* is shown. At a dosage of 400 mmg. per Kg. of air-dry soil, the damping off of tobacco seedlings has been reduced to $\frac{1}{8}$ that of controls. At higher dosages there was a phytocidal effect. It is also effective against *Heterodera marioni* on young tobacco plants; at a dosage of 400 mmg. per Kg. of soil nematode infestation was reduced to $\frac{1}{10}$ compared with controls.

Curing.

(*See also* 3762a.)

3760. Matthews, E. M., and others.
Curing bright leaf tobacco with forced ventilation.
Tech. Bull. Va agric. Exp. Stat. **116**, 1951, pp. 13, bibl. 9, illus.

The forced ventilation system for curing bright leaf tobacco has been used successfully over a 5-year period at the Bright Leaf Tobacco Station, Chatham, Va, and has resulted in a considerable reduction of fuel and labour costs. The construction of the insulated barn, the operation of the system and the curing procedure are described in detail with the aid of diagrams. Forced ventilation and recirculation by a fan makes it possible to lower the high temperatures usually required in the final stages of curing without prolonging the curing time, thus reducing the fire hazard. The barn temperature may be lowered rapidly after the tobacco is dry. With this system it was found possible to load the barn to 140-150% normal capacity by stacking the sticks much closer on the tiers without damage from sponging or scalding.

Marketing.

3761. Dewey, A. W., and Coutu, A. J.
Cigar leaf marketing studies. I. Market reporting for Connecticut Valley binder tobacco.
Bull. Storrs agric. Exp. Stat. Conn. **265**, 1950, pp. 36, map.

What might be contained in market reports for Connecticut Valley Broadleaf and Havana Seed cigar binder tobacco, how information necessary for preparing such reports might be collected, and what their economic significance might be for the Valley's binder-tobacco industry are considered in this bulletin. Its purpose is to assist the industry in reaching a decision regarding the desirability of establishing a market-reporting service. [Authors' introduction.]

Noted.

3762.

a BEINHART, E. G.
Farm and factory leaf curing technology of our processing.
Tobacco, 1950, **130**: 13: 23, 155, 158, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **A.I.C.-180,** Suppl. 5, abstr. 410.

b BERGMANN, M. E.
Microscopic studies of inclusion bodies found in plants infected with tobacco mosaic virus.
Science, 1951, **113**: 415-17, bibl. 7, illus.

c BERGMANN, M. E., AND FANKUCHEN, I.
X-ray diffraction studies of inclusion bodies found in plants infected with tobacco mosaic virus.
Science, 1951, **113**: 415, bibl. 6, illus.

d FEINSTEIN, L., AND MCCABE, E. T.
Quantitative test for nornicotine.
Analyt. Chem., 1951, **23**: 924-5, bibl. 1.

e GIRAUD, E.
Au sujet du mode d'emploi de H.C.H. et de S.P.C. sur tabac. **(On the method of application of HCH and SPC on tobacco.)**
Rev. int. Tabacs, 1950, **25**: 147, 149-50, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 648.
For control of mole crickets and click beetles.

f HENDERSON, R. G.
Vamorr 48 and 50; two new flue-cured varieties of tobacco resistant to mosaic and rootrot.
Bull. Va agric. Exp. Stat. **427**, 1949, pp. 10, illus. [received 1951].

g WILLIAMS, R. C., AND STEERE, R. L.
Electron microscopic observations on the unit of length of the particles of tobacco mosaic virus.
J. Amer. chem. Soc., 1951, **73**: 2057-61, bibl. 15.

h WILLIAMS, R. C., BACKUS, R. C., AND STEERE, R. L.
Macromolecular weights determined by direct particle counting. II. The weight of the tobacco mosaic virus particle.
J. Amer. chem. Soc., 1951, **73**: 2062-6, bibl. 22.

MISCELLANEOUS TEMPERATE AND TROPICAL CROPS.

Aromatics, spices, condiments.

3763. ANON.
Aromatic plants of India.
J. Sci. indust. Res. New Delhi, 1950, **9B**: 4: 237-43, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 407.
The paper deals with aromatic plants belonging to the families Lecythidaceae, Lythraceae, Sonneratiaceae, Passifloraceae, Caricaceae, Cucurbitaceae, and Begoniaceae.

3764. BOUQUET, A., AND KERHARO, J.
Les végétaux condiments de l'Afrique du Nord dans l'alimentation, la thérapeutique et la magie. **(The condiment plants of north Africa in nutrition, therapeutics and magic.)**
Acta trop., 1950, **7**: 237-74, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 710.
The plants are dealt with in 4 botanical groups: (1) conifers; (2) palms, cyperus, garlic, onions, saffron, ginger and *Aframomum melegueta*; (3) walnuts, hazel nuts and pepper species; and (4) cinnamon, laurel, nutmeg, hibiscus, rue, citrus, pistacio and raisins.

3765. ANON.
Gewürze (Herkunft, Beschaffenheit und Beurteilung). **(Spices: origin, quality and evaluation.)**
Gordian, 1950, **49**: 1182: 53-4, bibl., from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 243.
Culture and varieties of anise (*Pimpinella anisum*) and nutmeg (*Myristica fragrans*) are dealt with.

3766. ANON.
Balsam of Peru.
Perfumery ess. Oil Rec., 1950, **41**: 218, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 493.
The properties of Peru balsam and its extraction from the bast of *Myroxylon pereira* are dealt with.

3767. CALZECCHI-ONESTI, A.
Il cappero. **(Capers.)**
Ital. agric., 1951, **88**: 271-5, illus.
This is a description of capers (*Capparis spinosa*) with reference to their properties, distribution in Italy, varieties, cultivation, propagation (by cuttings), flowers and fruit.

3768. ANON.
Myrrh-agalloch.
Perfumery ess. Oil Rec., 1949, **40**: 106-7, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 524.
Notes on myrrh, obtained from various species of *Commiphora*, and agalloch, obtained from the wood of *Aquilaria ovata* and *A. agalochum*.

3769. LEFORTAIN, M.
Le marché du poivre en Indonésie. **(The pepper trade in Indonesia.)**
Rev. int. Prod. colon., 1950, **25**: 181-2, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 740.

A brief review of methods of cultivation and preparation of black and white pepper, with production and export figures.

3770. Flemion, F., and MacNear, B. T.
Reduction of vegetative growth and seed yields in Umbelliferous plants by *Lygus oblineatus*.
Contr. Boyce Thompson Inst., 1951, **16**: 279-83, bibl. 15, illus.

Umbelliferous seeds have been found to lack viable embryos owing to infestation of the plants with *Lygus oblineatus* which feeds by piercing and sucking. Experiments showed that, with dill (*Anethum graveolens*) and fennel (*Foeniculum dulce*) plants, *Lygus* caused considerable destruction of growing tips, flower buds and umbels; but that, when the attack started in the post-flowering stage, apparently normal seeds were produced. Many of the seeds were, however, devoid of embryos and germination percentage was consequently low. C.W.S.H.

3771. Flemion, F., Weed, R. M., and Miller, L. P.
Deposition of P^{32} into host tissue through the oral secretions of *Lygus oblineatus*.
Contr. Boyce Thompson Inst., 1951, **16**: 285-94, bibl. 22.

Since the injury done to seeds of umbelliferous plants is more than the mere withdrawal of fluids by *Lygus oblineatus* would warrant, experiments with radioactive phosphorus were carried out to determine whether the insects injected secretions into plants when feeding. The insects were fed on sucrose solutions to which P^{32} had been added. These insects were then transferred to bean pods and it was found that radioactivity was imparted to the bean pod tissue at the feeding site, thus showing that secretions had been injected by *Lygus*. C.W.S.H.

3772. Hardy, E.
Vanilla: orchid and flavour.
Perfumery ess. Oil. Rec., 1950, **41**: 174-5, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 462.

A general account of vanilla and its substitutes, including notes on drying and storage. Synthetic vanilla can be obtained from *Picea excelsa*.

Bamboos.

(*See also* 3831e, 3966.)

3773. Duval, G.
Contrôle da broca do bambu com soluções oleosas de inseticidas clorados. **(Control of bamboo beetle with oil solutions of chlorinated insecticides.)**
Biológico, 1950, **16**: 159-62, bibl. 2.

Technical DDT and gamma BHC, dissolved in diesel oil and applied to green bamboos immediately after they had been cut, gave complete protection against attacks of bamboo beetle (*Dinoderus minutus*). Chlordane and toxaphene in oil were less effective, while the diesel oil alone only gave protection for a short time.

3774. Plank, H. K.
Studies of factors influencing attack and control of the bamboo powder-post beetle.
Bull. P.R. fed. Exp. Stat. Mayagüez **48**, 1950, pp. 39, bibl. 26, illus., 15 cents.

Studies are described of the factors that influence the susceptibility of harvested bamboo to attack by the beetle *Dinoderus minutus* and of measures for its control. The presence of starch in the wood was found to be the most important factor influencing susceptibility. The standard test species, *Bambusa vulgaris*, contained the most starch and was usually the most extensively attacked; the relative susceptibility of 11 other species is indicated. Studies on control measures indicated that damage could be reduced by harvesting culms of *B. vulgaris* in their third year of growth or older, though some other species were better harvested earlier; by harvesting in August–December rather than in February–May; by clump-curing in the field; by placing freshly harvested culms in water for 8 weeks, though this also caused deterioration of the wood; by injecting copper sulphate into the sap stream; by impregnation with a synthetic resin; and by brushing freshly harvested culms with 5% DDT in kerosene or dipping them for 10 minutes in 5% DDT in fuel oil.

Fibres.

(*See also* 3831j, l, m, p, 4098, 4126.)

3775. Tirado T., A.
El fique. **(Henequen.)**
Rev. nac. Agric. Colombia, 1950, Vol. **44**, No. 543, pp. 24-7, illus.

The possibilities of extending the cultivation of henequen in Colombia are discussed and considered good. The requirements of the plant and its main pests and diseases are outlined.

3776. Poole, A. L., and Boyce, W. R.
Studies of phormium management, Moutoa estate, Foxton.
N.Z. J. Sci. Tech. Sec. A., 1949 (issued Dec. 1950), **31**: 4: 1-22, bibl. 5, illus.

The history of the New Zealand flax (*Phormium tenax*) industry at Foxton (south-west of North Island, N.Z.) is described, with a map of the district. Phormium spread over wide areas by means of a succession of drainage activities. "It would invade first the raupo belt and follow this into the lagoon area as raupo found its way there following drainage. By planting it was extended into the swamp scrub and even cleared forest areas. It therefore finally covered many areas sub-optimal to it, but remained in these only as long as management practice was intense enough to keep competing weeds in check."

3777. Critchfield, H. J.
***Phormium tenax*—New Zealand's native hard fiber.**
Econ. Bot., 1951, **5**: 172-84, bibl. 6, illus.

Phormium tenax, New Zealand flax, is native to New Zealand and Norfolk Island and the wild plant still contributes heavily to the fibre industry. Further supplies have been obtained first by improving, by drainage, the natural phormium swamps, and secondly by establishing plantations. The plant will grow on a

wide range of soils up to 4,000 ft. with a rainfall of from 20 to 150 inches, but it will not tolerate severe frost. There are three large estates in New Zealand. Propagation is by root division. The first harvest of leaves is taken after 5-6 years and another after a further 4-6 years. Spacing is 8 ft. × 4 ft. and a single plant produces 30 leaves at harvest. The leaves are cut 6-8 inches above ground and are then stripped by machine, washed, bleached in the sun and "scrutched" (to remove dry material) by machine. The fibre is used for woolpacks, matting, binder twine and lashing. The yield is a little less than 4 tons per acre per cutting. The chief disadvantages of this crop are the long periods between harvests and the presence of a yellow leaf disease which has yet to be controlled. C.W.S.H.

3778. DE SENNA BRAGA, O.
Cultura e beneficiamento do rami. **(Cultivation and preparation of ramie.)**
[*Publ.*] *Minist. Agric. Rio de Janeiro* S.I.A. **670**, 1947, pp. 45, illus. [received 1951].

This general account of all aspects of ramie production includes brief descriptions of various methods of decortication and degumming.

3779. CHALMIN, M.
Questions d'actualités sur le sisal. **(Some present-day problems of sisal production.)**
Rev. int. Prod. colon., 1950, **25**: 171, 173, 175-6, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 736.

The aspects of sisal production dealt with include soils, soil management, labour, cutting, yields, pests and diseases. Special reference is made to sisal cultivation in Angola.

Hops.

3780. MAJEWSKI, K.
Studia nad niektórymi cechami chmielu jako przyczynek do zagadnienia jego selekcji. **(Studies of some characters of hop-vines as a contribution to the problem of selection.)** [English summary 1½ pp.]
Ann. Univ. Mariae Curie-Skłodowska, Lublin Sect. E, 1950, **5**: 1: 1-28 + tables, bibl. 17.

This account of observations made at the Experiment Station for Hop-growing at the State Institute of Scientific Agricultural Researches at Pulawy, Poland, includes a comparison of the characters of wild and of cultivated hops, with notes on yields. An examination of material at Garbów in 1947 showed how miscellaneous the so-called "varieties" are as regards the colour of the bines and their earliness. As this is much the same in all hop-gardens in Lublin province, the necessity for obtaining recognized standard varieties is urgent.

3781. DARK, S. O. S.
A survey of the present position in hop genetics.
A.R. Wye Coll. Dep. Hop Res. for 1950, 1951, pp. 58-67, bibl. 35.

From this review of observations in England, in other European countries, and in the United States, it is concluded "that at present no classical genetics of the hop exists, but that various useful characters have been discovered in the course of spasmodic surveys".

3782. KELLER, K. R., AND LI, J. C. R.
Further information on the relationship between the number of vines per hill and yield in hops (*Humulus lupulus* L.).
Agron. J., 1951, **43**: 243-5, bibl. 4.

A yield trial of strobiles was conducted on the hop variety Fuggles, grown seedless, using 4, 5, 6, 7 or 8 vines per plant. The results indicated that the 4-vine plant plots produced a significantly lower yield of strobiles than the 5-, 6-, 7-, and 8-vine plant plots. The data further suggested that there were no significant differences in yield among the 5-, 6-, 7-, and 8-vine plant plots. The 6-vine plant plots produced the highest yield. It is unlikely that the true yield of the plants with more than 6 vines would be higher than that of the 6-vine plants. These findings should be interpreted as applicable only to those varieties of hops which possess side arm development characteristic of the variety Fuggles.—Oregon agric. Exp. Stat., Cornvallis.

3783. BONNET, J., AND COPPENS, R.
L'absorption des éléments nutritifs par le houblon. **(The absorption of nutrients by hops.)**
Ann. Gembl., 1950, **56**: 193-200, bibl. 2.

The work started in 1941 at the Institut Agronomique de l'État, Gembloux [see *H.A.*, 18: 2037] was continued in 1946 with 3 further varieties of hop, Buvrinne, Hybride 5/69 and Loerenhop. Analyses of the plants throughout the growing season and absorption curves are given. The results confirm those obtained previously. [For later work, see *H.A.*, 21: 815.]

3784. THOMPSON, F. C., CRIPPS, E. G., AND WATSON, G. A.
Some observations on the influence of subsoil fertility on the growth of the hop.
A.R. Wye Coll. Dep. Hop Res. for 1950, 1951, pp. 47-57, bibl. 6.

The evidence presented shows that over a 2-year period no appreciable response in growth, or in the reduction of symptoms of leaf chlorosis and scorch, was obtained by placement of fertilizers in the sub-soil around hop plants showing symptoms of nutrient disorders. The authors conclude that under conditions of clean cultivation the only practical measure which would seem likely to build up sub-soil nutrients would be placement of fertilizer at plough depth, either by actual ploughing down or by applying the fertilizer in the furrow bottom.

3785. ASKEW, H. O., AND MONK, R. J.
Boron in the nutrition of the hop.
Nature, 1951, **167**: 1074-5, illus.

In the extremely dry season of 1950-51 hop plants in New Zealand showed very unsatisfactory growth after early pruning, accompanied by at least some of the following symptoms: Great delay in the development of new shoots associated with a crinkled condition and malformation of the leaves; short internodal spacing; development of secondary laterals at an early age; and dying of the growing point. Incidence of these defects varied from garden to garden, while the severity of

symptoms varied from point to point within a garden or on a given soil type. The good health of whole rows, where borax had been applied two years earlier for experimental purposes, suggested boron deficiency as the cause of the disorder. Data are presented on the boron content of shoots of affected and healthy plants leading to the preliminary conclusion that for healthy growth hop shoots require a boron content of not less than 20 p.p.m. in the dry matter. This is believed to be the first report of boron deficiency in hop.—Cawthron Inst., N.Z.

3786. KEYWORTH, W. G.
Split leaf blotch disease of the hop (*Humulus lupulus*).
J. hort. Sci., 1951, **26**: 163-8, bibl. 7, illus.

The first symptom of split leaf blotch is a spidery appearance of affected plants early in the season. Such plants produce only a few stems, some of which are small and stunted, the remainder being of normal length but bearing only a few small leaves; the stems are often dark green or reddish. The diseased plants usually occur in small groups or rows. Later in the season light green areas appear on the leaves; they turn pale yellow and then transparent or oily in appearance. Uneven growth of the leaf causes distortion and the tissues in the affected patches may die or fall out, leaving irregular holes and splits. The disease can be transmitted by grafting and so is presumed to be caused by a virus.—East Malling Research Station.

3787. RIPPER, W. E.
Insect control and the new systemic insecticide for hops.
J. Inst. Brew., 1951, **57**: 119-22.

Following a description of the characters of the principal insect pests of hops, an account is given of the development of organo-phosphorus insecticidal preparations. One of these, Schradan (Pestox 3), 66·6% active ingredient, used at ⅜ gal. per 100 gal. water, is absorbed into the plant sap and proves lethal to sap-sucking insects without killing predatory insects such as ladybirds which merely suffer contact with the spray. The protective effect is long-lasting, and whilst treatment within 6 weeks of hop picking is not recommended, there is no evidence that the sprayed plants are toxic to higher animals a short time after treatment. [Author's abstract.]

3788. GIBB, J. A. C., AND CHATER, G. P.
A preliminary survey of hop picking machines.
A.R. Wye Coll. Dep. Hop Res. for 1950, 1951, pp. 72-82, illus.

Samples of machine- and hand-picked hops are compared, and various picking mechanisms are described. The illustrations show the relative amounts of whole and broken hops, leaf, and strig of typical hand-picked, typical machine-picked and badly machine-picked samples.

3789. BURGESS, A. H.
The use of sulphur in hop drying.
A.R. Wye Coll. Dep. Hop Res. for 1950, 1951, pp. 83-4.

As strict economy should be exercised in the use of sulphur during the present shortage, these notes have the object of assisting hop-growers to make the best and most economical use of the sulphur at their disposal. The process of sulphuring, the action of the sulphur dioxide produced, and the speed of the air draught are discussed.

3790. DE WEVER, J., AND VAN MOLLEM, A.
Le dosage des acides amers au cours de la maturation du houblon. **(The determination of bitter acids during the maturation of hops.)**
Fermentatio, 1950, No. 5, pp. 123-8, from abstr. in *Ann. Gembl.*, 1951, **57**: 58.

Using the technique of Professor Bogaert, the authors investigated the humidity and bitter acid content of several varieties of hop in the trial grounds of the Institut National Belge du Houblon.

3791. BURGESS, A. H., AND TATCHELL, A. R.
Progress report on studies of deterioration of hops during storage.
A.R. Wye Coll. Dep. Hop Res. for 1950, 1951, pp. 21-46, bibl. 18.

The author, after an introduction, deals first with the effects of conditions of hop storage, and then with the mechanism of the oxidation of humulone. A varietal characteristic of hop samples is the varying rate of deterioration. Cold storage usually reduces the rate of deterioration. Storage in nitrogen, carbon dioxide and hydrogen sulphide arrests deterioration, oxygen accelerates deterioration and eliminates the varietal characteristics. The rate of deterioration increases with increase in moisture content of the hops. Humulone undergoes spontaneous deterioration in air; hop oil prevents its crystallization and accelerates deterioration. Lupulone accelerates the deterioration of humulone.

3792. SUTCLIFFE, H. M., ERNST, A. J., AND ARONOVSKY, S. I.
Hop vines for paper.
The Hopper, 1950, **6**: 10: 4-7, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **A.I.C.-187,** Suppl. 5, p. 1.

Preliminary pulping tests on hop vines indicate that this material could probably be used as filler material in corrugating paper or board products during periods of shortage of more suitable raw materials. The hop vine pulp appears to be unsuitable, practically and economically, for fine specialty paper pulps.

Loofahs.

3793. SPOON, W.
Luffa. **(Loofahs.)** [English summary 1¼ pp.]
Reprinted from *Tijdschr. econ. soc. Geog.*, 1950, **41,** p. 259, bibl. 14, illus., being *Ber. Afd. trop. Prod. kon. Vereen. ind. Inst.* **230,** pp. 10, illus.

Interest has recently been taken in the possibility of growing loofahs (*Luffa cylindrica* Roem.] in Surinam for export, and the author here discusses the uses and cultural requirements of the plant. The cultivation of the vine and preparation of the loofahs requires much care and labour, and for this reason the main exporting country is Japan, where labour is cheap.

It is considered that the crop could be grown successfully on smallholdings in Surinam and the Dutch Windward Islands, but would be uneconomic on large estates.

Medicinal plants.

(*See also* 3674c, 3802-3820, 3831k, 3987-3990, 4097, 4116, 4124, 4141.)

3794. VALENZUELA, P., AND OTHERS.
Constituents, uses and pharmacopoeias of some Philippine medicinal plants.
Philipp. J. For., 1949, **6**: 39-111, bibl., from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 265-6.

An alphabetical list is given of 147 medicinal plants from the Philippines, with native and botanical names, together with information on the parts used, the active principles and their uses, and an extensive review of the literature.

3795. ANON.
Ipecacuanha from *Cephaelis acuminata*.
Chem. and Druggist, 1950, **154**: 464-5, map, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 743.

Information is given on the distribution in Costa Rica of *Cephaelis acuminata* which is almost exclusively exploited in the wild state. The preparation of the roots is dealt with and export figures are given for 1937-49.

3796. BONTEKOE, M. A.
De Kolanoot (cola). **(The cola nut.)**
T. Econ. Soc. Geogr., 1950, **41**: 5: 115-20, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 437.

This general article on the cola nut contains a botanical description and notes on climatic requirements, history, distribution, production and uses in various countries, pests, harvesting and export figures.

3797. VAN DUUREN, A. J.
The extraction of the poisonous substances from the seeds of *Croton tiglium*.
Chron. Nat., 1950, **106**: 466-74, bibl. 12.

The physic-nut, *Croton tiglium*, is cultivated in western China, where the seeds are used for their insecticidal properties and as a fish poison. A method for extraction of the toxic substances from the ground seeds, using activated bleaching clay as an adsorbing agent, is described. In toxicity tests on the million fish, *Lebistes reticulatis*, the concentrate obtained by this method proved more active than rotenone.

3798. FAIRBAIRN, J. W., AND LOU, T. C.
A pharmacognostical study of *Dichroa febrifuga* Lour., a Chinese antimalarial plant.
J. Pharm. Pharmacol., 1950, **2**: 162-77, bibl., illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 244.

The roots and defoliated tops of *Dichroa febrifuga* (Hydrangeaceae) have long been used in China in antimalarial medicines. Since 1944 the plant has been cultivated in South Szechwan. An anatomical and microscopical description and the composition of various parts of the plant are given.

3799. DHAR, D. C., DHAR, M. L., AND SHRIVASTAVA, D. L.
Chemical examination of the seeds of *Emblica officinalis* Gaertn.: Part I—The fatty oil and its component fatty acids.
J. sci. industr. Res. India, 1951, **10 B**: 88-91, bibl. 5.

The seeds of the medicinal plant *Emblica officinalis* (=*Phyllanthus emblica* Linn.) yielded 16% brownish yellow oil on extraction with ether. The purified oil contained 87% mixed acids, sitosterol and a crystalline substance giving the characteristic reactions for phytosterol.—Central Drug Res. Inst., Lucknow.

3800. SINGH, D. P.
Indian ephedras and their supply.
Indian Forester, 1950, **76**: 288-9, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 525.

An optimistic survey of the possibilities of using the Indian *Ephedra* species, *E. gerardiana* and *E. intermedia*, in the preparation of ephedrine hydrochloride.

3801. OVERSACQ, J.
Les plantes qui guérissent: le coquelicot. **(Medicinal plants: the field poppy.)**
Courr. hort., 1951, **13**: 362.

The properties of the field poppy [*Papaver rhoeas*] are mentioned in relation to its possible substitution for the opium poppy. All parts of the plant contain the alkaloid rhoedin. Its medicinal properties are set out, and from an infusion of petals a test paper can be prepared which turns red with acids and blue with alkalis.

Essential oil plants.

(*See also* 3672, 3813a, b, 3896, 3954, 3963b, e, 4104.)

3802. ESDORN, I.
Untersuchungen über den Einfluss verschiedener Faktoren auf den ätherischen Ölgehalt an absterbenden Pflanzen. **(The effect of various factors on the essential oil content of withering plants.)**
Phytopath. Z., 1951, **17**: 433-43, bibl. 17.

The author confirms previous work indicating that, when organs of aromatic plants are cut off and begin to wither, the oil content increases. In relation to this he gives data for various treatments on *Ocimum basilicum* (basil), *Eucalyptus globulus* (blue gum), *Mentha piperita* (pepper mint), *Satureja* [*Satureia*] *hortensis* (summer savory) and *Monarda fistulosa* (wild bergamot).

3803. GERŠTEĬN, L. A.
The inheritance of the quality of essential oil in certain eucalyptus hybrids. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **78**: 937-40, bibl. 6.

Hybridization experiments with *Eucalyptus* spp. are described, with a table of data showing the content and the physico-chemical constants of the essential oil of hybrids and parent species.

3804. JONES, M. A., AND ARRILLAGA, N. G.
The production of lemon-grass oil.
Bull. P.R. fed. Exp. Stat. Mayagüez **50**, 1950, pp. 41, bibl. 136, illus., 15 cents.

The information contained in this bulletin is based both on world literature on the culture and processing of lemon grass (*Cymbopogon* spp.) and on experiments carried out at the Federal Experiment Station in Puerto Rico. About 1,000,000 lb. of the essential oil is produced annually, mostly in the tropics. The grass is propagated by division of stools and 4-bud pieces are planted every 2 ft. in rows 3 ft. apart. Planting is best done in the rainy season and a well drained soil is desirable. The crop may be grown on hillsides as a soil-conserving grass. No shade should be used. The grass responds to fertilization with compost, manure, N and K, and is best cut about 4 times a year at a height of 2½ to 3½ ft. Processing equipment, distillation methods and the composition of the oil are dealt with.

3805. VAN PROOIJEN, A. M.
Majorana. (*Origanum majorana.*)
Pharm. T., Belgium, 1949, **26**: 141-8, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 265.
A historical account of *Origanum majorana* [the species from which the essential oil of majoram is obtained].

3806. ČIRIKOV, JU, F.
The formation of essential oil in mint during the course of the day. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 405-7.
The formation of essential oil in mint takes place only during daylight and is accompanied by accumulation of acids.

3807. GREEN, R. J.
Studies on the host range of verticillium that causes wilt of *Mentha piperita* L.
Science, 1951, **113**: 207-8, bibl. 4.
In susceptibility tests on 21 species of weeds growing in proximity to crops of peppermint, *M. piperita*, the strain of *Verticillium albo-atrum* B11B attacking that crop was isolated from only one species, the closely related *M. rotundifolia*. Out of 9 crop plants the fungus was recovered in a few instances from only 2 species, *Solanum melongena* and *Capsicum frutescens*. *V. albo-atrum* B11B was found to exist as a saprophyte on the debris of 10 plant species, the debris of *M. piperita* itself being a particularly suitable substrate. The significance of this from the standpoint of control lies in the fact that peppermint debris left after distillation of the oil is commonly used as an organic manure. The susceptibility of *M. piperita* to isolates of *V. albo-atrum* from other plants was also studied.—Purdue Univ.

3808. HOTIN, A. A.
The effect of light and nitrogen fertilizing on the yield of *Ocimum gratissimum.* [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **76**: 299-302, bibl. 7.
Slight shading, by lowering the dry-mass yield, significantly raised the essential oil content of the dry leaf. Short-day plants, particularly those receiving ammonium fertilizer, yielded the most valuable raw material, as this contained least moisture and most essential oil.

3809. DEOGUN, P. N.
Camphor—its possible sources and production in India.
Indian Forester, 1950, **76**: 139-43, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 740.
The possibility of producing camphor in India from *Ocimum kilimandcharicum* is discussed.

3810. WILSON GREENE, L.
Indian vetiver oil.
Perfumery ess. Oil. Rec., 1949, **40**: 390-1, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 524.
The ageing of vetiver oil is discussed. The results of analyses of different kinds of vetiver oil are given, and recommendations made for its standardization.

3811. ANON.
Indian vetiver (Khus) and its oil.
Perfumery ess. Oil Rec., 1950, **41**: 219-22, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 490.
A detailed study is reported of the composition of the essential oil of *Vetiveria zizanoides*, a perennial grass. Analyses of samples from India are compared with those from Java, Réunion, Fiji, the Seychelles, Malaya and Jamaica.

Seed oil plants.

(*See also* 3957-3962, 3963c, 4015, 4016.)

3812. GUPTA, S. S., HILDITCH, T. P., AND RILEY, J. P.
The fatty acids and glycerides of castor oil.
J. Sci. Food Agric., 1951, **2**: 245-51, bibl. 6.
The oils from 19 specimens of castor seed (*Ricinus communis*) grown in widely different parts of Africa, America and Asia have been studied at Liverpool University. The seeds from different locations varied greatly in size, but the ratio of shell to kernel and the oil contents of the seeds did not, for the most part, differ materially. The component acids of nearly all the oils were remarkably similar. [From authors' synopsis.]

3813. ANON.
Eine neue Art Rizinus. (**A new variety of *Ricinus.***)
Bull. Ind. Gesandtsch., Bern, 1950, **2**: 11: 13, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 463.
The cultivation is described of a variety of castor oil plant that produces 312·5 kg. seed per ha. with an oil content of 47%.

3814. BHASIN, M.
Chemical examination of the seeds of *Cucumis utilissimus* Roxb.
J. sci. industr. Res. India, 1950, **9 B**: 230-4, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 681.
Results of analysis of the seeds of *Cucumis utilissimus*, varieties Saharanpur and Lucknow, showed that they contained a semi-drying oil which was practically identical in the two varieties.

3815. Crossley, A., and Hilditch, T. P.
The fatty acids and glycerides of okra seed oil.
J. Sci. Food Agric., 1951, **2**: 251-5, bibl. 9.
The component acids and glycerides of okra (*Hibiscus esculentus*) seed oil from the Sudan have been investigated at Liverpool University. The oil is very similar in constitution to cottonseed oil and should be completely suitable for purposes for which cottonseed oil is used.

3816. Bagge, H.
Forsøg med sorter af opiatvalmue 1941-1947. **(Variety trials with opium poppy 1941-47.)**
Tidsskr. Planteavl, 1950, **54**: 81-92, being *Beretn. Stat. Forsøgsvirks. Plantekult.* **435.**
In these trials, in which Danish, Dutch and German varieties of opium poppy were tested at the Danish State Experiment Stations, the highest yields were obtained from the blue-seeded German variety Mahndorfer.

3817. Bagge, H.
Artsforsøg med olieplanter. 1942-1949. **(Trials with oil plants 1942-49.)**
Tidsskr. Planteavl, 1950, **54**: 107-14, being *Beretn. Stat. Forsøgsvirks. Plantekult.* **437.**
Opium poppies, radishes and—to a smaller extent—safflowers were included in these experiments, for which data on yield of seed and crude fat are presented, both from field and marsh soils.

3818. Kellenbarger, S., Albrook, R. L., and Harrington, A. H.
Safflower. Agronomic, processing, and economic data.
Bull. Wash. St. Inst. Tech., Div. industr. Res. **210.** *Bull. Inst. Agric. Sci., Wash. agric. Exp. Stat.* **521,** pp. 23.
Safflower requires 120-150 days to mature. Seedbed preparation is similar to that of wheat or peas, and planting is either in close stands with a 35 lb./acre seed rate or in rows 2 to 3 ft. apart with seed rates of 15-17 lb./acre. Weed control presents some difficulty as initial growth is slow and hormone weed-killers affect the safflower plants. Irrigation, when practised, needs careful attention as the plants are sensitive to excessive water. Harvesting is carried out by combine. The variety N-852 has the highest oil content but is susceptible to root rot on irrigated areas. N-6 and N-8 are resistant to root rot and more suited to irrigated areas. The oil can be extracted by chemical solvents or by expeller equipment. A better return is obtained from the extraction process, but the capital outlay is higher. Economically in eastern Washington it was concluded that returns would compare favourably with peas, but less favourably with cereals, particularly wheat. C.W.S.H.

3819. Chakrabarty, M. M., and Hilditch, T. P.
The fatty acids and glycerides of an Indian sesame oil.
J. Sci. Food Agric., 1951, **2**: 255-9, bibl. 16.
The component acids and glycerides in sesame (*Sesamum indicum*) oil extracted from seed grown in Eastern India were studied at Liverpool University.

3820. Tischer, J., and Patzenhauer, A.
Ueber die Zusammensetzung des Samenöles der Spitzklette *Xanthium riparium*. **(The composition of the oil of *Xanthium riparium* seeds.)**
Fette u. Seifen, 1950, **52**: 137-40, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 408.
The composition of the oil from seeds of *Xanthium riparium* was investigated. The oil appears to be suitable for the food, drug and cosmetic industries.

Rubber plants.

(*See also* 4102.)

3821. Ozerov, G. V.
The ability of guayule to regenerate lost organs. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **74**: 841-4.
Experiments with cuttings in water and young plants in boxes showed that guayule (*Parthenium argentatum*) rapidly produces new growth after injuries, e.g. removal of leaves or apical bud of cuttings, or cutting back young plants. The results suggest the advisability of cutting back the plants and utilizing the resulting young growth for caoutchouc production.

3822. Arreguin, B., Bonner, J., and Wood, B. J.
Studies on the mechanism of rubber formation in the guayule. III. Experiments with isotopic carbon.
Arch. Biochem. Biophys., 1951, **31**: 234-47, bibl. 15.
In earlier experiments it has been shown that acetate can serve as a substrate for support of increased rubber synthesis in guayule seedlings or excised guayule tissues. It has now been shown by the use of acetate labelled with isotopic carbon that the carbon from exogenous acetate is actually incorporated in the rubber formed by guayule. Acetate is metabolized by guayule tissues through a variety of pathways. Synthesis to rubber constitutes a pathway of only minor importance. Synthesis to other isoprenoid compounds, the resins, is a second pathway of quantitative significance. Half or more of the acetate given is, however, metabolized to amino acids, in particular to the branched-chain amino acids leucine and valine on the one hand and the dicarboxylic amino acids aspartate and glutamate on the other. [From authors' summary.]—Calif. Inst. Technol., Pasadena.

3823. Ozerov, G. V., and Pavlov, A. N.
The effect of soil moisture on the frost resistance of guayule. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 845-8, bibl. 6, illus.
Young guayule seedlings were raised and then transplanted to pots of soil at 30, 50 and 70% saturation. In the middle of September when growth was arrested they were transferred to soil of 30% saturation and later submitted to artificial freezing (−13·5° C.) for a short time. When they resumed growth it was found that the plants grown in soil at 50% saturation

were more resistant to frost injury than those at 30% or 70%.

3824. Maštakov, S. M., Kulakovskaja, T. H., and Nikitin, B. M.
The laticiferous system and caoutchouc production in kok-saghyz. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 841-4, bibl. 11.

Factors to be considered in caoutchouc production in kok-saghyz are the concentration of latex, the size of the laticiferous vessels, and the number of rings of laticiferous vessels. The soil conditions (peaty soil being very suitable) and the selection of high-yielding varieties are of particular importance in caoutchouc production.

3825. Kalinkevič, A. F.
The effect of nitrate and ammoniacal nutrition on the development of the laticiferous vessels and the biosynthesis of caoutchouc in the roots of kok-saghyz. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **78**: 1187-9, bibl. 12.

The growth of leaves and roots of kok-saghyz and the development of the laticiferous vessels in them, during the period from the rosette phase to flowering, is better with nitrate than with ammonium nitrogen fertilization. The deposition of caoutchouc in the laticiferous vessels, however, during the period when it is most intense proceeds most vigorously with ammonium nitrogen. Thus nitrate nitrogen is preferable when the laticiferous vessels are developing and ammonium nitrogen when caoutchouc is being deposited.

3826. Maštakov, S. M., and Goljdina, S. M.
Copper, manganese and iron in kok-saghyz plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 1077-80, bibl. 5.

The data from analyses of kok-saghyz plants and of the caoutchouc obtained from them, in relation to the application of copper fertilizer, are tabulated. It is concluded that the relatively low copper content of the plants and of the caoutchouc lead one to suppose that copper has no direct negative effect on the quality of the caoutchouc, but its presence, together with manganese, may increase the catalytic activity of iron which is present in relatively large amounts.

3827. Medvedev, P. F.
The different responses of kok-saghyz and krym-saghyz to soil acidity. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **74**: 785-8, bibl. 4.

An acid soil inhibits the growth and development of kok-saghyz and reduces the quantity of leaves and roots; young plants perish and surviving plants have a low yield. Krym-saghyz is more resistant to soil acidity and so can be grown in soils unfavourable for kok-saghyz (pH 5·0–6·0).

3828. Neĭman, M. B., Prokofjev, A. A., and Šantarovič, P. C.
Carbohydrates as initial product in the synthesis of caoutchouc in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **78**: 367-70, bibl. 7, illus.

From the results of the experiment with kok-saghyz described it is concluded that the caoutchouc in the laticiferous vessels of rubber-producing plants arises as a result of the reconstitution of sugars derived from the leaves. The final stages of caoutchouc synthesis are effected in the laticiferous vessels. The first stages of carbohydrate reconstitution takes place in other tissues, probably in the parenchyma.

Sugar maple.

3829. Olmsted, C. E.
Experiments on photoperiodism, dormancy and leaf age and abscission in sugar maple.
Bot. Gaz., 1951, **112**: 365-93, bibl. 44.

Experiments were carried out on 500 sugar maple (*Acer saccharum*) seedlings to determine the effect of length of day, chilling and chronological age of leaves on leaf senescence and abcission and on bud break and dormancy. Five experiments are described in detail. Leaf yellowing and abscission were found to be basically conditioned by the naturally decreasing autumnal photoperiod. Chronological age had only a minor effect, the younger leaves persisting a few days longer. Senescence and abscission were delayed by constant photoperiods of 16, 12 and 8 hours. Loss of green colour always preceded abscission. Bud break at the normal time took place only after several hundred hours of chilling. Some unchilled plants remained dormant for 15-18 months and then grew after chilling. Others eventually grew without chilling. Long photoperiods helped to induce bud break with inadequately chilled plants. In an experiment in which plants were brought into a warm greenhouse at intervals from early December, earliest bud break was shown by those plants which had been exposed longest. The largest leaves were produced by 20 hours' photoperiod or by natural photoperiod. Bud rest was not determined primarily by photoperiod, but with a 9-hour photoperiod there was no second flush of leaves. The relationship between the effect of chilling and the distribution of the species is discussed. C.W.S.H.

Tannin plants.

3830. Ivanov, V. V.
A shrubby sea lavender as a source of tannin. [Russian.]
Priroda, 1951, **40**: 5: 64, bibl. 12.

The semi-shrubby sea lavender, *Statice suffruticosa* L., a typical plant of the low ground around the Caspian Sea, is found to contain 5·9 to 8·57% tannins, the maximum amount occurring in the period from the end of flowering to the beginning of maturation of the fruits.

Noted.

3831.
a Anon.
Guajachoutolie. **(Essential oil from *Bulnesia sarmienti*.)**
Naarden Nieuws, 1950, **11**: 2, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 772.

b ANON.
Oil from *Melaleuca alternifolia*.
Perfumery ess. Oil Rec., 1950, **40** [**41** ?]: 149-50, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 491.

c ANON.
La culture du sisal à Madagascar. **(Sisal culture in Madagascar.)**
Marchés Col. du Monde, 1950, **6**: 1689, 1691, 1693, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 614.

d BORJA CARBONELL, J.
Estudio fitográfico de la Sierra de Corbera (Valencia). **(A study of the vegetation of Sierra de Corbera (Valencia).)**
An. Jard. bot. Madrid, 1948-49 (issued 1950), **9**: 361-483, bibl. 35, illus. [received 1951].
Including a short section on useful and medicinal plants.

e DABRAL, S. N.
A preliminary note on propagation of bamboos from culm segments.
Indian Forester, 1950, **76**: 313-14, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 520.
Trials with several varieties.

f DARPOUX, H.
Maladies nouvelles ou peu connues du carthame (*Carthamus tinctorius* L.). **(Diseases new or little known of safflower.)**
Ann. Épiphyt., 1946, **12**: 297-315, bibl. 15, illus. [received 1951].

g GOOD, H. M., AND NELSON, C. D.
A histological study of sugar maple decayed by *Polyporus glomeratus* Peck.
Canad. J. Bot., 1951, **29**: 215-23, bibl. 17, illus.

h HIRST, E. L.
The chemistry of plant gums and mucilages.
Endeavour, 1951, **10**: 106-11, bibl. 22.
A review of the subject.

i JACOBS, H., AND KOOLHAAS, D. R.
Zuivering en modificatie van Indonesische natuurlijke harsen. **(Purification and modification of the natural resins of Indonesia.)**
Verfkroniek, 1950, **23**: 209-11, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950. **5**: 590.

j MCILROY, R. J.
Phormium gum.
J. chem. Soc. Lond., 1951, pp. 1372-3, bibl. in text.
Gum exuded by the leaves of New Zealand flax.

k VAN PROOIJEN, A. M.
Pharmacohistorische studiën: XLVI. *Nux vomica*. **(Historical pharmaceutical studies. XLVI. *Nux vomica*.)**
Pharm. T., Belgium, 1950, **27**: 109-16, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 712.
Historical, botanical and pharmaceutical data on the vomic nut.

l PYNAERT, L.
Le sisal au Conge Belge. **(Sisal culture in the Belgian Congo.)**
Rev. int. Prod. colon., 1949, **24**: 33, 35, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 459.

m ROUSSEAU, A.
La culture du sisal à Madagascar. **(Sisal culture in Madagascar.)**
Rev. int. Prod. colon., 1949, **24**: 39-40, 43, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 459.

n TANG, W. H., AND CHEN, T. H.
Derris in Taiwan. II. Physical and chemical properties. [Chinese with English summary 8 lines.]
Taiwan Sugar J. Quart., 1950, **2**: 3/4: 199-227, bibl. 69.
A review of world literature.

o THOMAS, J. B.
On the metabolism of damar [*Agathis dammara* Rich.] seeds.
Ann. bot. Gdns, Buitenzorg, 1941, **5**: 94-114, bibl. 4 [received 1950].

p WALLY-VAN VREESWIJK, A. C.
De cultuur, winning en verwerking van de ramievezel in Japan. **(Cultivation, extraction and preparation of ramie fibre in Japan.)**
Meded. Min. Welvaart, Indonesia **16**, 1950, pp. 185, bibl., illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 614.
[A summarized version of this article has been published in English, see *H.A.*, 21: 1836].

FLORICULTURE.

General.

(*See also* 3206, 3263, 3264, 3359, 3446, 4081, 4082, 4094, 4099, and annual report section.)

3832. BOSSARD, R.
Comparaison de deux méthodes pour évaluer le prix de revient des cultures florales. **(A comparison of two methods of estimating the cost of production of flower crops.)**
Rev. hort. Paris, 1951, **123**: 351-2.
By keeping a detailed record of the labour required for the various cultural operations on a certain crop, and taking into account the cost of materials used, it is possible to deduce the cost of production of a specified number of plants. This method is useful for certain monocultures out of doors, but it is impracticable when several crops are grown under glass because there are too many " dead periods ", the time required for the different operations is too variable, and it is too difficult to apportion the cost of fuel and general upkeep among the various crops. The method recommended for glasshouse flower crops and certain outdoor cut flowers is to record all the expenses incurred per surface unit. Knowing the number of plants per sq. m., it is thus possible to calculate the

cost of production per plant or the cost of a crop at any period of its life. It is pointed out that only two-thirds of the glasshouse space is usable in practice, and this must be taken into account in the calculations.

3833. Canetto, M.
Un essai de bouturage avec les plantes "hormonées" dans la pratique horticole courante. **(A trial in the use of hormones for rooting cuttings under commercial conditions.)**
Rev. hort. Paris, 1951, **123**: 431-2.

The use of the proprietary growth substance Rootone as a dry dust resulted in very rapid rooting of many flower species under normal commercial conditions. Hormone treatment of cuttings taken from flowering anthemis plants in March resulted in a saving of 3 weeks propagating time. It was noticed that cuttings which had begun to wilt before being planted and watered grew exceptionally well. A safer technique, which also gave good results, was to plant turgid cuttings in damp sand and to delay the first watering until signs of wilting appeared.

3834. Schwanitz, F., and Schwanitz, H.
Untersuchungen an polyploiden Pflanzen. X. Weitere Beiträge zur Sexualität polyploider Pflanzen. **(A study of polyploid plants. X. Further contributions to the sexuality of polyploid plants.)**
Züchter, 1950, **20**: 336-46, bibl. 51, illus.

The study is based on a variety of plants polyploidized by colchicine treatment, but it is not possible to report more than a few general conclusions and to make reference to more than a few isolated observations on plants of horticultural interest. (1) In *Papaver nudicaule* and *Aquilegia skinneri* high chromosome numbers are associated with a decrease in the number of anthers. (2) In certain plants fewer pollen grains per anther develop as a result of chromosome doubling and in others malformations of the pollen occur. (3) In tetraploid asters the proportion of green or rudimentary flowers was much higher than in diploid plants. (4) The amount of tillering in tetraploid *Dianthus barbatus*, *Allium schoenoprasum*, *Digitalis purpurea*, *Salvia sclarea* and *Melissa officinalis* is about half of that in diploid plants. (5) The poor functioning of the sexual organs in polyploid plants is believed to be due to a deterioration in the transport of reserve materials caused by the increase in cell size.

3835. Rust, I.
Estimated 1950 salable production of tropical flowers and foliage, territory of Hawaii.
Agric. Econ. Rep. Hawaii agric. Ext. Serv. **6**, 1951, pp. 9.

As a basis for establishing a co-operative marketing organization for tropical flowers and foliage a survey was made in 1950 of the number of growers in each of the 4 main islands, the number of mature plants, and the estimated production of flowers or leaves per plant per annum. The flowers were anthurium, bird of paradise, cattleya, cypripedium, dendrobium, ginger, heliconia, phalaenopsis, plumeria, the vandas Joaquim (with much the biggest output of any) and Strap Leaf, and wood rose. The foliage plants were croton and green and red ti.

3836. Cook, R. L.
Nutrient levels for flowering crops.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 446-56, bibl. 4, illus., being *J. Art. Mich. agric. Exp. Stat.* **1098.**

Nutrient level studies are described in which all combinations of NPK at several levels were applied to calendula, forget-me-not, coleus, geranium and cyclamen grown in sandy soil in pots. The first two plants in particular showed markedly different responses to various nutrient levels. The trials indicated clearly the interaction between nutrients and the importance of a proper balance between them. The nutrient combinations found to be the most favourable for the 5 plants are tabulated.

3837. van Marle, G. S.
Spintbestrijding met moderne insecticiden in de Aalsmeerse Bloementeelt. **(The control of red spider with modern insecticides in the Aalsmeer flower-growing industry.)** [English summary 5½ pp.]
Meded. Inst. PlZiekt. Onderz. Wageningen **18**, [? 1951], pp. 127, bibl. 115, illus.

Roses and carnations cannot be profitably grown without the control of red spider. It also seriously infests gerbera, bouvardia, stocks and hydrangea. Three of the acaricides studied for controlling the mite are already in use in commercial nurseries, i.e. TEP, azobenzene, and parathion. TEP is used only on a small scale because it has no ovicidal and residual effects. Azobenzene is a good acaricide with good ovicidal action; its disadvantages are its slow action, its failure to kill all the adult females, and its phytotoxicity. Parathion is also effective except when used as a dust; repeated treatments are necessary and to some crops it is phytocidal (e.g. roses).

3838. Lindhardt, K.
Angreb af nematoder på violer, anemoner og liljer. **(The infestation by nematodes of violets, anemones and lilies.)** [English summary 18 lines.]
Reprinted from *Gartner-Tid.*, 1950, No. 42, pp. 2, bibl. 2, illus.

An account is given of the discovery in Denmark of violets infested with *Aphelenchoides fragariae* R.B.1891 (Syn. *A. olesistus* R.B.), and an attack by the same nematode on *Anemone japonica*, *Lilium phillipinense formosanum* and *L. longiflorum* is mentioned. It was evident that infection spread to the lilies from diseased strawberry plants. Experiments have shown that *A. fragariae* from strawberry could easily be transferred to other hosts, e.g. begonia, dahlia, nicotiana, scindapsus, cyclamen and asplenium.—Statens plantepatol. Forsøg.

Annual and herbaceous plants.

(*See also* 3152, 3167-3170, 3176, 3916b, c, d, e, g, u., 4091.)

3839. Caballero Lopez, C.
Fertilidad conseguida en especies del género *Gasteria* Duval mediante tratamiento hormónico. **(Fertility induced in aloes by hormone treatment.)**
An. Jard. bot. Madrid, 1947, **8**: 89-130, bibl. 21, illus. [received 1951].

Sterility in aloes (*Gasteria* spp.), which often occurs when the plants are cultivated in Europe, was overcome in several species by treatment of the open flowers with hormones, especially 2,4-D. Seeds were produced which germinated normally. It is believed that the production of fertile fruits was the result of a hormonal excitation of the normally fertilized ovary, which helped to overcome the reproductive inertia of the plants. The possibility, however, of " fertile, artificial parthenocarpy " is discussed. This is the first case of sterility having been overcome by hormone treatment in monocotyledons, and the second case among higher plants as a whole.

3840. Van Laan, G. J., and Cook, R. L.
The effect of three methods of watering on the production of carnations in several soils and soil mixtures.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 415-22, bibl. 5, illus., being *J. Art. Mich. agric. Exp. Stat.* **1089.**

Greenhouse carnations were grown in 6 different soils or soil-muck mixtures and were watered either by surface irrigation with a hose, by sub-irrigation by injection and drainage, or by sub-irrigation with a constant water level. On all soils sub-irrigation with drainage produced greater total plant growth and better quality blooms than surface irrigation. Constant water level sub-irrigation produced the highest yield of both blooms and plants on a clay soil plus muck, but the lowest yields of any treatment on a sandy soil; other soils were intermediate with yields improving as the clay content increased. In general the quality of the blooms parallelled the yield. The effects of the treatments on soil structure and moisture are indicated.

3841. Hendrix, J. W., and Murakishi, H.
Influence of some soil treatments on the rooting and survival of carnation slips in Hawaii.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 491-7, illus., being *Tech. Pap. Hawaii agric. Exp. Stat.* **198.**

Three trials are described in which chloropicrin applied to carnation cutting beds at 600 lb. per acre or formaldehyde at ½ gal. of 1: 50 solution per sq. ft. materially reduced mortality among rooted plants. Although these treatments might usefully supplement the cutting treatments described in the following abstract, it still remains to determine means of controlling several soil-borne pathogens in the field phase of the crop.

3842. Murakishi, H., and Hendrix, J. W.
The effect of growth substances and fungicides on the rooting and survival of carnation cuttings grown in naturally infested soil.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 485-90, bibl. 11, illus., being *Tech. Pap. Hawaii agric. Exp. Stat.* **200.**

In an effort to obtain satisfactory rooting of outdoor carnation cuttings planted in wilt-infested soil in the Koko Head area of Oahu, the cuttings were treated with 11 fungicides and 6 growth substances alone or in combination. Neither fungicides nor growth substances alone showed any consistent benefits, but an improvement resulted from certain combinations, notably when the fungicides used were Fermate and Zerlate and the growth substances indolebutyric and indoleacetic acids. Subsequently, however, many rooted plants succumbed to root rot and wilt indicating a loss of protective power by the fungicide in the soil. [See also preceding abstract.]

3843. Kamp, J. R., and Bluhm, C. R.
Effect of nutrients on the rooting responses of softwood cuttings.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 482-4, bibl. 3.

In trials with carnation and chrysanthemum cuttings standing the cuttings for one hour with their basal ends in an NPK nutrient solution produced a significant improvement in rooting whether or not hormones were also used. The standard nutrient solution consisted of 6 g. per litre of an equal concentration by weight of monopotassium phosphate and diammonium phosphate. A half-strength solution was slightly less effective, and a double-strength solution showed no additional benefit.

3844. Thomas, W. D., Jr.
Soil treatment for the control of fusarium of carnations.
Colo St. Flower Grs' Bull., Dec. 1950, pp. 1-2, from abstr. in *Bull. N.Y. St. Flower Gr.*, 1951, No. 68, p. 7.

Goodrite z.a.c., Crag F 531 and Dithane Z-78 used in solution, 1 oz. to 32 gal. of water being applied at the rate of 12 gal. per 100 sq. ft., gave good control of fusarium wilt of carnations, and increased flower production.

3845. Anon.
Root diseases and crown rot of carnations.
Agric. Gaz. N.S.W., 1951, **62**: 37-8, illus.

The chief causes of loss in carnations are the root and crown rots, but leaf spot and rust, if allowed to become established, will impair vigour and bloom quality. Mosaic also affects vigour. For the control of root diseases it is important, when establishing a carnation bed, to avoid introducing contaminated soil on rooted cuttings, gardening implements, etc. Cuttings should be taken from strong, healthy plants and rooted either in clean virgin soil, or if this is not available, in soil sterilized by treatment with formalin or steam.

3846. Beach, G.
Some effects of sodium selenate on greenhouse carnations grown in gravel—second report.*
Proc. Amer. Soc. hort. Sci., 1950, **56**: 423-6, bibl. 3.

In trials with carnations grown in gravel culture a Fort Collins, Colorado, 4 applications of sodium selenate at 3⅛ g. per 100 sq. ft. made at monthly intervals starting 6 weeks after the plants were planted showed the following results by comparison with untreated control plots: Adequate control of red spider, *Tetranychus telarius*; a greater total yield of flowers; equal production of early flowers and of flowers of different quality grades; and more short-stemmed flowers.

* For first report, see *H.A.*, 20: 348.

3847. NEAL, M. C.
Common and aberrant flowers of *Cassia fistula*.
Pacific Sci., 1951, **5**: 82-9, bibl. 11, illus.
The flower structures in the common form and an aberrant form of *Cassia fistula* growing in Honolulu are described and illustrated. 2,4-D may possibly account for certain, but not all, of the features in the aberrant form, which may be a sport.

3848. FUCHS, H.
Cultures spéciales de chrysanthèmes. **(Special types of chrysanthemum.)**
Rev. hort. Paris, 1951, **123**: 418-21, illus.
Brief notes are given on varieties and their culture of *Chrysanthemum rubellum*, double flowered summer types, and Korean, pompon, cascade, pyrethrum-flowered and anthemis-flowered types.

3849. ENGLISH, L. L.
Sodium selenate soil treatments for chrysanthemum and carnation pests.
J. econ. Ent., 1951, **44**: 208-15, bibl. 9.
Two soil applications of sodium selenate at the rate of 31·25, 62·5 and 125 milligrams per sq. ft. gave very good control of aphids, mealybugs and mites on the chrysanthemum varieties tested. Pest control on carnations with sodium selenate soil treatments was, however, difficult to maintain for more than a year without using high dosages which stunted the plants.

3850. CALDWELL, J.
Further observations on chrysanthemum virus disease.
Gdnrs' Chron., 1951, **129**: 141.
Referring to an earlier article on mosaic disease [see *H.A.*, 21: 1884] the author points out that 3 viruses are now reported as occurring in the chrysanthemum, viz. spotted wilt, cucumber mosaic and aspermy disease.

3851. EHRENHARDT, H.
Versuche zur Vernichtung der Chrysanthemen-Gallmücke an einem neuen Herd in Süddeutschland. **(Chrysanthemum gall midge control trials in a new infestation centre in southern Germany.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1951, **3**: 84-6, bibl. 17.
In both laboratory and field trials E 605 forte at 0·05% was the most effective material used. In field trials 5 outdoor spray applications followed by 2 greenhouse treatments gave very satisfactory control of the midge. While no damage due to treatment was observed on mature plants, young plants appeared to be affected by E 605 even at 0·025%.

3852. FULTON, R. A., SMITH, F. F., AND KONECKY, M. S.
Comparative toxicity of vapors of four organic phosphates to chrysanthemum aphid and two-spotted spider mite.
J. econ. Ent., 1950, **43**: 940-1, bibl. 4.
The data presented show that air saturated with vapours from tetraethyl pyrophosphate, hexaethyl tetraphosphate, tetraethyl dithiopyrophosphate, or parathion produces significant mortalities of the chrysanthemum aphid (*Macrosiphoniella sanborni*) and the two-spotted mite (*Tetranychus bimaculatus*). The results obtained with the vapours of these phosphorus-containing insecticides corroborate indications from experiments with greenhouse aerosols. When used as aerosols these chemicals act by both contact and fumigation. The relatively slower killing action of parathion and its ineffectiveness against the resistant strain of the two-spotted mite have been demonstrated. [Authors' conclusions.]

3853. DIMITRI, M. J.
Las " cinerarias " ornamentales cultivadas en la Argentina. **(Ornamental " cinerarias " grown in the Argentine.)**
Rev. argent. Agron. B. Aires, 1951, **18**: 18-32, bibl. 22, illus.
Six species of *Senecio* or *Centaurea*, all commonly termed " cinerarias ", are grown for ornament in Argentina. Apart from the well-known *Senecio cruentus*, grown as a pot or bedding plant, *Centaurea cineraria, C. ragusina, Senecio vira-vira, S. montevidensis* and *S. cineraria* are grown for their hoary foliage and are rarely allowed to flower, a fact which may account for the confusion that exists concerning nomenclature. Each species is described and illustrated. *S. vira-vira* has only recently been introduced into cultivation and is outstandingly resistant to drought.

3854. LIHNELL, D.
Några iakttagelser om bladrullning hos cinerarior. **(Observations on leaf roll in cineraria.)**
Växtskyddsnotiser, 1950, No. 4, pp. 49-55, illus.
Leaf roll of cineraria is not of great economic importance in Sweden, but 10-15% of the plants may well be affected in a nursery. Although the symptoms appear to a certain extent in apparently healthy scions grafted on affected stocks, the trouble is not believed to be due to a virus. From the high percentage of leaf roll occurring in subjects raised from affected plants or from crosses with affected plants it is concluded that the condition is genetically determined. Environmental factors, such as light and nutrition, were found to influence symptom expression considerably. Thus, the specimens showing leaf roll after grafting are thought to have been genetically liable to exhibit the symptoms anyhow under favourable conditions.

3855. KROMDIJK, G.
Le kalanchoë. **(The kalanchoë.)**
Courr. hort., 1951, **13**: 88-9, illus.
The introduction of *Kalanchoë globulifera coccinea* into commerce is referred to and improved varieties are mentioned. Its propagation by seeds and by cuttings, and the application of " short day " treatment to induce early flowering are described.

3856. SNYDER, R. J., AND LARSON, R. E.
Petunia hybrids.
Science for the Farmer, June 1951, pp. 8-9, illus., being *Suppl. 63rd A.R. Pa agric. Exp. Stat.* 1949/50 **3**.
The relative merits of 10 petunia varieties as parents for vigorous and prolific or large-flowered hybrids

are recorded. The hybrid Celestial Rose × Igloo yielded the most blossoms, 274 per plant.

3857. Post, K., Bing, A., and Horton, F. F.
Keep poinsettias hot.
Bull. N.Y. St. Flower Gr., 1951, No. 68, pp. 5-6, illus.

In trials at Cornell poinsettia stock plants grown at 80° F. gave the highest number of cuttings. The most significant increase in the number of cuttings occurred when the temperature was raised from 60° to 70° F. Very little growth was observed at temperatures below 60° F.

3858. Tompkins, C. M., and Middleton, J. T.
Etiology and control of poinsettia root and stem rot caused by *Pythium* spp. and *Rhizoctonia solani*.
Hilgardia, 1950, **20**: 171-82, bibl. 10, illus.

Poinsettia, *Euphorbia pulcherrima*, grown under glass in California has frequently been subject to severe losses due to a root and stem disease, the symptoms of which are described. In experiments with cuttings 3 species of *Pythium* and *Rhizoctonia solani* were found to cause the disease. The poinsettia varieties Oak Leaf, Mrs. Paul Ecke, Henrietta Ecke and Albert Ecke were found to be highly susceptible. The disease may be controlled in propagators by steam or chemical sterilization of the sand rooting medium, and good results have also been obtained with Ferbam (ferric dimethyl dithiocarbamate) dusted on to the surface of the sand and on to the cuttings immediately before setting them in the sand. The use of sterilized pots and potting soil at transplanting time has also proved essential. Proper ventilation, air temperature, humidity and watering are important contributing factors in avoiding disease.

3859. Dimock, A. W.
Poinsettia trouble a result of root rot.
Bull. N.Y. St. Flower Gr., 1951, No. 69, pp. 4-8, bibl. 4, illus.

Experiments have shown that root rot, caused by the fungus *Thielaviopsis basicola*, is in all probability the major contributory factor to the poinsettia disease, which has done much damage in New York in the past 2 years. Absolute glasshouse hygiene with liberal use of Ferbam or other disinfectant, sterilization of propgating benches, rooting media and potting soil are suggested for control. Plants kept at high temperatures, because of their more vigorous growth, appear to be more resistant to the disease.

3860. Ludlow, F.
The primulas of Kashmir.
J. roy. hort. Soc., 1951, **76**: 191-206, bibl. in text, illus.

Notes are given on 18 species of *Primula* found in Kashmir, together with an identification key.

3861. Cayeux, L.
Les récentes améliorations du "*Primula malacoides*". **(Recent improvements in *Primula malacoides*.)**
Rev. hort. Paris, 1951, **123**: 452-3, bibl. 13, illus.

The progress made during the last 30 years in the improvement of flower shape, size and colour and plant form of *P. malacoides* is briefly reviewed, with particular reference to French work. The species has now become of commercial value.

3862. Svešniková, I. N.
The morphology of the inflorescence of the genus *Primula* L. [Russian.]
Bot. Zurnal, 1951, **36**: 160-74, bibl. 8, illus.

The morphology of *Primula* inflorescences is described under (1) whorled umbels, (2) the simple umbel, (3) the capitate inflorescence, (4) the tassellate and spicate inflorescences, (5) the sessile umbellate inflorescence.

3863. Wynd, F. L., and Bowden, R. A.
Response of snapdragons to very insoluble iron-containing frit.
Lloydia, 1951, **14**: 34-9, bibl. 2, illus.

Tetra snapdragons (Burpee No. 1576) were grown on normal, highly fertile, greenhouse soil, and in similar soil containing a finely ground, very insoluble, glassy, iron-containing frit, added at the rate of 2 oz. per sq. ft. of soil surface. The control plants were satisfactory in the current commercial sense, and they averaged 38 in. in height, while the plants growing on the frit-treated soil were markedly superior and they averaged 75 in. in height. The general problem of trace element deficiency, in the absence of visible specific symptoms, was discussed. The usability of finely ground, very insoluble glassy frits incorporated in the soil as a source of trace elements in highly fertile greenhouse soil was described. [Authors' summary.]

3864. Dimock, A. W., and Baker, K. F.
Effect of climate on disease development, injuriousness, and fungicidal control, as exemplified by snapdragon rust.
Phytopathology, 1951, **41**: 536-52, bibl. 25, illus.

Results reported show that the optimum temperature for completion of the life-cycle of the snapdragon-rust fungus (*Puccinia antirrhini*) is in the range 70° to 75° F., whereas the optimum for uredospore germination and infection is 50° to 55° F. Excellent correlation was found between the intensity of rust in experimental plots in five States and that which would be expected on the basis of temperature and moisture records. Under semi-arid conditions host injury resulted almost exclusively from desiccation of the rust-invaded tissues. Zineb (Parzate) gave excellent control at all locations.—Cornell Univ. and Univ. of Calif.

3865. Severin, H. H. P., and Tompkins, C. M.
Aphid transmission of severe-mosaic virus of annual stock.
Hilgardia, 1950, **20**: 93-108, bibl. 8, illus.

In addition to a mild-mosaic disease a severe-mosaic disease of annual stock, *Matthiola incana* var. *annua*, causes striking colour-breaking of the flowers and conspicuous mottling and malformation of the leaves in California. The cabbage aphid, *Brevicoryne brassicae*, and the turnip or false cabbage aphid, *Rhopalosiphum pseudobrassicae*, transmitted the severe-mosaic virus to 3% and 6% of healthy stock plants, but the green peach aphid, *Myzus persicae*, failed to transmit the disease. None of the three species of aphid infected cauliflower with the severe-mosaic virus. The

virus was found to be of the non-persistent type in the aphid vectors.

3866. Robertson, R. M.
The germination of sweet peas.
Gdnrs' Chron., 1951, **129**: 148.
It is shown how presoaking and germinating at a controlled temperature improved the germination of sweet pea varieties with hard seed-coats.

Bulbs, tubers, etc.

(*See also* 3916i, j, k.)

3867. Hoare, E. R.
A new technique in bulb planting.
Grower, 1951, **36**: 117-18, illus.
Two experiments are described briefly. In the first, covering 3 years, bulbs were planted upright or at various angles. Planting upside down, which with random sowing would occur only occasionally, depressed yields by about 10%. Planting at other angles had no effect on yield or flowering. In the second trial, still in progress, planting 3 rows 3-4 in. apart on ridges with 12 bulbs planted per foot of ridge and 28 in. between ridges is being compared with the standard flat or Dutch bedding system in which 5 or 6 rows 7-9 in. apart are planted with the bulbs about three bulb diameters apart. Preliminary observations suggest that the new method will save labour in planting provided suitable machinery is developed, will greatly facilitate subsequent cultivation including mechanical harvesting, and may reduce the spread of diseases such as fire because persons tending the crop do not brush against the foliage. An experimental bulb planter working on the hydraulic lift of a tractor is illustrated.—Nat. Inst. agric. Engng.

3868. James, W. O., and Beevers, H.
The respiration of *Arum* spadix. A rapid respiration, resistant to cyanide.
New Phytol., 1950, **49**: 353-74, bibl. 20, illus.
The respiration of the spadix of *Arum* species is shown to have Q_{O_2} up to 31·8 in air. There is a progressive increase of respiration rate with increasing oxygen concentration up to 100%. The adjacent stalk tissue has a maximum of 5-10% oxygen. Active gas exchange continued in cell-free extracts with R.Q. approx. 1 and the respiration characteristics of such extracts were closely similar to those of the intact tissue. The available data are taken to indicate that the abnormally rapid respiration rate of aroid spadices involves the breakdown of starch *via* hexosediphosphate, and that the oxidation stage depends, at least in large part, upon a flavoprotein enzyme. Metalloenzymes play no part. [From authors' summary.]—Oxford Univ.

3869. Lewis, C. A.
Daylength controls flowering of tuberous-rooted begonias.
Bull. N.Y. St. Flower Gr., 1951, No. 67, pp. 2-3, 8, illus.
In trials at Cornell, begonias given 14 or 16 hour days, or interrupted dark period providing a total of 12 hours of light, were brought into flower successfully during the winter months. Both the camelliaflora and multiflora varieties responded well to the treatment, and when 12 hours or less light was given the plants stopped growing and flowering and tuberization occurred.

3870. Rodionenko, G. I., and Zaar, É. I.
Obtaining dahlia twin plants. [Russian.]
Priroda, 1951, **40**: 5: 62-3.
In a study of the effect of the environment on the "doubling" of the capitula in dahlia the author required pairs of genetically similar plants so that one of each pair could be used as a control for the other. He describes a method by which germinating dahlia seeds can be cut into halves, each of which will grow into a normal plant. The seeds are germinated on moist filter paper and when the roots are 0·2 to 0·5 mm. long the young plant is cut longitudinally and the two halves are induced (by a method described) to grow independently into normal plants.

3871. Seeley, J. G.
Mineral nutrient deficiencies and leaf burn of Croft easter lilies.*
Proc. Amer. Soc. hort. Sci., 1950, **56**: 439-45, bibl. 7, illus.
When Croft lilies were grown in sand cultures at Cornell University the disorder known as leaf burn and spotting occurred equally with a complete solution and with solutions deficient in N, P, K, Ca, Mg and B. Deficiency symptoms, flowering and growth of plants in each treatment are described. The various treatments had little effect on time of flowering or on flower production except in the Ca-deficient cultures where many buds "blasted".

3872. Allmendinger, D. F., Miller, V. L., and Johnson, F.
The control of fluorine scorch of gladiolus with foliar dusts and sprays.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 427-32, bibl. 6, illus., being *Sci. Pap. Wash. St. agric. Exp. Stats* **876**.
Several alkaline dusts and sprays and particularly lime sprays markedly decreased scorch of gladiolus caused by atmospheric fluoric effluents. The lime absorbed considerable quantities of fluorine, and the amount of fluorine in the plant tissue declined as the effectiveness of the treatments in controlling scorch increased.

3873. Robertson, N.
What is "premature yellowing" of gladioli?
Reprinted from *Gladiolus Annual*, 1951, pp. 3.
A "yellows" disease of gladiolus caused by a fungus near *Fusarium orthoceras* f. *gladioli*, and resembling in symptoms the disease reported in America, occurs in Dutch stock grown in Britain. The disease is responsible for some at least of the condition previously known as "premature yellowing". Control measures are discussed in relation to American work, viz. soil fumigation, the use of disease-free stock, rotation, and rogueing.—Bot. School, Cambridge.

3874. Goodey, J. B.
A secondary piliferous layer on the roots of *Hippeastrum*.
Nature, 1951, **167**: 822-3, bibl. 3, illus.

* See also *H.A.*, 20: 1849, 1850.

During the examination of a *Hippeastrum* plant the roots of which were badly attacked by a species of the nematode genus, *Rotylenchus*, it was noticed that some of the undamaged parts of the roots were covered with root hairs right up to the base of the bulb. The root hairs were found to be of secondary origin arising from cortical cells. This is believed to be the first report of a secondary piliferous layer.—Rothamsted exp. Stat.

3875. Edwards, E. E., and Bevan, W. J.
On the narcissus flies, *Merodon equestris* (F.) and *Eumerus tuberculatus* (Rond.) and their control.
Bull. ent. Res., 1951, **41**: 593-8, bibl. 9.

In laboratory and field experiments conducted at Llandaff, Cardiff, it was shown that DDT and, in particular, BHC provide a much more effective and practical means of controlling infestations of the narcissus flies than any other methods hitherto tested. The percentage of narcissus bulbs attacked by the larvae of *Merodon equestris* was reduced to 6·04, 2·05 and 9·58 (2 years' average) by DDT, BHC and calomel respectively, as against 27·69 in the controls, the corresponding figures for infestation by larvae of *Eumerus tuberculatus* being 0·25, 0·36 and 4·27, as against 5·49 in the controls.

3876. Hartsema, A. M., and Luyten, I.
Over het blindstoken van tulpen. **(The so-called "stoking blind" of tulip bulbs.)** [English summary ½ p.]
Meded. LandbHoogesch. Wageningen, 1950, **50**: 83-101, bibl. 5, illus., being *Meded. Lab. Plantphys. Onderz. LandbHoogesch.* **82.**

After the summer treatment of tulip bulbs some growers apply a special treatment with high temperatures to obtain larger bulbs. This is apt to cause blindness of the bulbs by destroying the young flowers. This effect has been studied by the authors, the result being that they issue a warning against the so-called "stoking blind". An effective alternative summer treatment of the bulbs (e.g. for the Darwin tulips Rose W. Copeland and Le Nôtre) proved to be storing for 11 to 13 weeks at 20° C., which produced large main bulbs and relatively few and small side-bulbs.

Ferns.

(*See also* 3916p, v.)

3877. Severin, H. H. P., and Tompkins, C. M.
Symptoms induced by some species of aphids feeding on ferns.
Hilgardia, 1950, **20**: 81-92, bibl. 8, illus.

Four species of aphid were collected on two varieties of maidenhair fern. One of these, the foxglove aphid, *Myzus solani*, feeding on fronds of the birds-nest fern, *Asplenium nidis*, and of the holly fern, *Crytomium falcatum*, produced chlorotic areas. Fronds developing subsequently continued to show symptoms, indicating the systemic nature of the causative agent. The fern aphid, *Idiopterus nephrelepidus*, on birds-nest ferns produced dark green areas with severe distortion of older fronds. Similar symptoms appeared on newly developing fronds of some plants after all the older infested fronds had been cut off. Mechanical inoculations failed to induce symptoms.

Orchids and glasshouse plants.

(*See also* 3847, 3889, 3890, 3891, 4088.)

3878. Orchid Growers' Association.
Orchids (i) and (ii).
North. Gdnr, 1950, **4**: 255-8, 284-93, illus.

Notes on orchid history, genera, cultivation in the glasshouse [in England] and pest control.

3879. Jensen, D. D.
Mosaic or black streak disease of *Cymbidium* orchids.
Phytopathology, 1951, **41**: 401-14, bibl. 8, illus.

Mosaic or black streak, a prevalent disease of *Cymbidium* orchids, is described and shown to be caused by a virus. It occurs throughout North America and England, and is probably the same disease as that reported from Australia. Three species of *Cymbidium* and many hybrids have been found naturally infected with the virus. Early symptoms are chlorotic streaks and patches on the younger leaves. Later there is conspicuous mosaic mottling and necrosis as spots, streaks and rings. Seed transmission of the virus seems unlikely.—Univ. of California.

3880. Dickinson, J.
Propagating saintpaulias.
J. roy. hort. Soc., 1951, **76**: 277.

Paper is tied over the top of a 1 lb. jam jar filled to the brim with soft water. Three holes are made in the paper and a well-matured leaf is inserted into each of the holes, the stems being pushed well down into the water. The jar is then stood on a shelf in full light, but never direct sunlight, and in about 6 weeks fine, white rootlets appear, followed by tiny clusters of leaves. When the largest leaf of the cluster is ½ to ¾ in. high the plantlets are potted and the mother leaves removed.

3881. Tunblad, B.
Ett nytt (?) skadedjur i växthus. **(A new (?) glasshouse pest.)**
Växtskyddsnotiser, 1950, No. 5-6, pp. 65-8, illus.

Glasshouse plants showing symptoms of an unknown trouble were eventually found to be infested by the mite *Hemitarsonemus latus*. *Cissus*, ivy and *Fatshedera* were more severely injured by the pest than others, the first two having bare tendrils with no or very small, malformed leaves and leaf buds, while the older *Fatshedera* leaves were curiously shrivelled and twisted and of a darker colour. For a fuller description of the mite and its biology, see van Merle, *Tijdschr. PlZiekt.*, 1944, Vol. 2. The control measures discussed have so far not been tested at the Swedish Plant Protection Institute.

3882. Tunblad, B.
Var försiktig med azobensolpreparaten **(Care is necessary with azobenzene)**
Växtskyddsnotiser, 1950, No. 5-6, pp. 69-70, illus.

In a glasshouse in Sweden all *Streptocarpus* plants were severely damaged by azobenzene applied for red spider control, while none of the other plants suffered any injury. Subsequent tests at the Swedish Plant Protection Institute showed that another member of

the family Gesneriaceae, viz. *Saintpaulia*, is also very susceptible to the acaricide. In further trials a list was drawn up of plants liable to azobenzene injury, though not so severe. They were *Achyranthes*, *Adiantum*, *Antirrhinum*, *Anthurium*, *Aucuba*, *Azalea*, *Calceolaria*, *Cyclamen*, *Lathyrus*, *Primula obconica*, *P. chinensis* and *P. malacoides*, *Pteris*, *Schizanthus* and *Zinnia*.

3883. Smith, F. F., and Fulton, R. A.
Two-spotted spider mite resistant to aerosols.
J. econ. Ent., 1951, **44**: 229-33, bibl. 9.

In comparative greenhouse tests using 2 strains of mites those found to be resistant to parathion were also resistant to some extent to 8 other organic phosphates and to 3 unrelated compounds. Their resistance to parathion was not lost when they were reared without exposure to insecticides. Resistant mites were most effectively controlled by tetraethyl dithiopyrophosphate, octamethyl pyrophosphoramide, and *p*-chlorophenyl *p*-chlorobenzene sulphonate. No morphological differences have been found between resistant and non-resistant mites.

3884. Doutt, R. L.
Biological control of mealybugs infesting commercial greenhouse gardenias.
J. econ. Ent., 1951, **44**: 37-40, bibl. 3.

A very heavy infestation of *Pseudococcus citri* on gardenias was reduced to a low level and control maintained by introduced parasites and predators, of which the most effective were *Exochomus flavipes*, *Anagyrus kivuensis* and *Chrysopa californica*. The method was found to be practical if used in conjunction with an acaricide, innocuous to beneficial insects. Under these conditions, biological control of *Saissetia hemisphaerica* also occurred as a result of the parasitic activities of *Metaphycus helvolus* and *Encyrtus infelix*.

3885. Smith, F. F., and Fulton, R. A.
Octamethyl pyrophosphoramide for the control of spider mites and aphids on greenhouse ornamentals.
Flor. Exch., 1951, **116**: 24: 9, 40, bibl. 2.

Octamethyl pyrophosphoramide is a systemic insecticide absorbed into the plant, particularly by the young upper parts, where it becomes sufficiently concentrated in a few days to be toxic to spider mites and aphids. For roses the use is recommended of either aerosols at the rate of 1 lb. of 5% or 10% formulation per 50,000 or 100,000 cu. ft. repeated at 2 or 3 weeks intervals, or foliage sprays at a 1: 1,000 dilution, most suitable for control of localized infestations, or soil applications of 1: 2,400 dilution. The chemical is somewhat more toxic than parathion to warm-blooded animals, and hence must be handled with great care.

Roses.

3886. Zimmerman, P. W., and Hitchcock, A. E.
Rose " sports " from adventitious buds.
Contr. Boyce Thompson Inst., 1951, **16**: 221-4, bibl. 3, illus.

A new kind of rose (sport) appeared on a branch of Briarcliff variety. The new rose flower was single and pink. The parent plant was a double pink. When plants of the sport were propagated from stem cuttings, they continued to show the same characteristics. When plants were propagated from root cuttings involving adventitious buds, they reverted to the original Briarcliff variety. The variety Better Times came true to type when propagated by stem cuttings but reverted to Briarcliff characteristics when propagated from root cuttings. Also another unidentified red rose produced pink flowers when propagated from root cuttings. Souvenir variety (yellow) which is known to be a bud sport of Talisman (red) gave rise to Talisman type plants from root cuttings. It was concluded that the rose varieties described were probably periclinal chimaeras and that plants arising from adventitious buds of endogenous origin were like the variety which constituted the stele (core). [Authors' summary.]

3887. Hendrickx, A.
" A.A.R.S." et " U.R.S.": pour de meilleures nouvelles roses! **(The A.A.R.S. and the U.S.R. for the best new roses.)**
Courr. hort., 1951, **13**: 22-5, illus.

This is an account of the work and organization of the " All American Rose Selection " (A.A.R.S.) and the newer " Universal Rose Selection " (U.R.S.) societies. The centre of the U.R.S. is at Antibes, in south-east France.

3888. Buck, G. J., and Volz, E. C.
Root-growth in spring- and fall-planted roses.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 471-4, bibl. 10, being *J. Pap. Ia agric. Exp. Stat.* **J-1740.**

Under the conditions of this experiment rose plants transplanted in the spring and those transplanted in the fall had produced equal quantities of roots by 11 May, five weeks after the frost was out of the soil. A greater number of new roots were formed on fall-planted roses in the spring than were formed in the same length of time in the fall. Those roots which do develop in the fall following fall-planting are quite susceptible to injury from low soil temperatures during the winter. [Authors' summary.]

3889. Seeley, J. G.
Potassium deficiency of greenhouse roses.*
Proc. Amer. Soc. hort. Sci., 1950, **56**: 466-70, bibl. 8, illus.

Rose plants grown with an insufficient supply of potassium responded first by producing shorter flowering shoots and flowers slightly smaller than normal, followed by a chlorosis resembling that of a mild deficiency of iron. With severe potassium deficiency, the lower foliage abscissed; flower buds often did not open, and die-back of the stem followed. The rapid recovery in growth of the potassium-deficient plants after potassium was supplied in the solution indicates that potassium is rapidly absorbed, translocated, and utilized in the rose plant. [From author's summary.]—Cornell Univ.

3890. Asen, S., and Davidson, O. W.
The boron distribution in greenhouse rose plants.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 433-8, bibl. 10.

In sand culture studies on roses receiving varying amounts of B it was found that the distribution of B in

* For previous account of this work, see *H.A.*, 20: 978.

the plants followed a regular pattern. The highest concentration occurred in the leaves and this increased markedly as the B content of the nutrient solution was increased. At high concentrations zonal accumulation occurred in the leaf blade tissue, especially along the periphery. The pistils contained large amounts of B, whereas the B content of the stamens was relatively low.

3891. EASTWOOD, T. M., AND GIANFAGNA, A. J.
Corncob mulch for greenhouse roses.
Bull. N.Y. St. Flower Gr., 1951, No. 68, p. 8.
Ground corn cobs gave good weed control in rose beds, but provided no other benefit to cut flower production.

3892. ROBERTS, A. N.
Pre-storage defoliation of field grown roses with certain chemical sprays and dusts.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 475-81, bibl. 2, being *Tech. Pap. Ore. agric. Exp. Stat.* **613.**
Tests are described from which it is concluded that certain defoliant sprays offer considerable promise for removing the leaves of roses in the autumn prior to lifting. Of the materials tried the best was Nacconol NR at 2% to 4%, depending on variety and time of application, plus 3% summer oil. A copper sulphate-talc dust was effective with some varieties but not others.

3893. MCCLELLAN, W. D., AND SMITH, F. F.
Karathane for controlling two-spotted spider mites and powdery mildew on roses.
Abstr. in *Phytopathology*, 1951, **41**: 563.
Good control of mildew was obtained on roses with 1 to 3 weekly applications of Karathane (a 25% wettable powder of 2-capryl-4, 6-dinitrophenyl crotonate) at 0·5 or 0·75 lb./100 gal.+0·4 pt. Santomerse S. In the laboratory it was found that, although nearly complete kill of spider mites in all stages occurred, the few survivors laid eggs normally, indicating a lack of residual toxicity.

3894. ENGLISH, L. L.
Azobenzene as an effective supplement in organic phosphate aerosols for control of the two-spotted spider mite.
J. econ. Ent., 1950, **43**: 838-43, bibl. 8.
Aerosol mixtures of azobenzene and azobenzene in combination with parathion, tetraethyl pyrophosphate, and tetraethyl dithionopyrophosphate were tested on natural populations of the two-spotted spider mite (*Tetranychus bimaculatus*) on potted roses. Azobenzene proved to be mainly ovicidal and formed an effective supplement for the phosphates which were effective against the mites but not the eggs. Azobenzene-parathion mixtures showed commercial promise on mites susceptible to parathion, but satisfactory control was not obtained on parathion-resistant mites. None of the aerosol mixtures used damaged roses. [Author's summary.]

Shrubs and trees.

(*See also* 3916a, 4083.)

3895. HILDRETH, A. C.
Ornamental hedges for the central Great Plains.
Fmrs' Bull. U.S. Dep. Agric. **2019,** 1950, pp. 25, illus.
Eighty-three species, varieties and forms of shrubs are described briefly and evaluated for hedge purposes [other than major shelter belts] on the central Great Plains. Most of them were tested in hedge trials at the Cheyenne Horticultural Field Station, Wyoming. The bulletin also includes advice on planting, cultivation, pruning and pest and disease control.

3896. DE ARRUDA VEIGA, A.
O que já se fez no Horto Florestal de Batatais. (**A report of the work done at the Batatais Forestry Garden [Brazil].**) [English summary ¾ p.]
Rev. Agric. Piracicaba, 1950, **25**: 95-114, bibl. 9.
Observations on the propagation of several tree species, including *Acacia mollissima*, *Grevillea robusta* and *Eucalyptus citriodora*, made during the establishment of the Forestry Garden at Batatais, are recorded.

3897. BODMER, H.
Erfahrungen mit Bewurzelungshormonen in der Schweiz. (**The use of rooting hormones in Switzerland.**)
Dtsch. Baumsch., 1951, **3**: 2-3, 6.
Calux, α-naphthaleneacetic acid, is said to induce rooting in cuttings of ornamental shrubs and trees and pot plants, but to be unsuitable for dwarf conifers and fruit trees. The best results were obtained in rooting media having a relatively low pH. A warning is given against the use of copper-containing fungicides on treated plants.

3898. PRIDHAM, A. M. S.
Preliminary report on defoliation of nursery stock by chemical means.
Suppl. Proc. 5th annu. Mtg N.E. Weed Control Conf. 1951, New York, pp. 127-38.
Both in laboratory and field trials at Cornell, Endothal spray was found to defoliate effectively a number [listed] of ornamental trees and shrubs. Defoliation was followed by rapid leafing out in many species; during warm weather it is recommended that the stock should be dug within a week or 10 days of application. Results of other defoliation treatments, both chemical and mechanical, are briefly reported.

3899. (LOHMEYER, V. K.)
Acacia seed germination.
J. Dep. Agric. S. Aust., 1951, **54**: 301.
The dormancy of acacia seed is due to a hard outer covering impermeable to water. This coat must be broken to allow water to reach the embryo before germination can occur, and there are three methods which may be used: (1) Seeds may be placed among dying embers of a fire and allowed to remain until cool; the seeds need not be planted immediately after treatment. (2) The seed can be scratched with a file to allow water to enter. (3) Seeds may be boiled for one minute and then removed from the boiling water; planting should be done soon after treatment.

3900. KORČAGIN, A. A.
A new (long fruited) variety of the bird cherry *Padus racemosa* (Lam.) Gilib. [Russian.]
Bot. Zurnal, 1951, **36**: 197-8, illus.
The author describes a long-fruited variety of *Padus racemosa* [=*Prunus padus*] found by him in the basin

of the R. Mezen, northern Russia, as a new form with the varietal name *dolichocarpa*.

3901. Johnson, A. T.
Calluna.
J. roy. hort. Soc., 1951, **76**: 232-6, illus.
An enumeration of the many and varied uses of ling, ranging from the provision of building material and fertilizers to the tanning of leather and manufacture of brushes, is followed by notes on some of its horticultural forms.

3902. Carranza, J. M.
Antracnosis del aguaribay causado por *Myxosporella schini* sp. nov., en la Argentina. **(Anthracnose of the Californian pepper tree, caused by *Myxosporella schini* sp. nov. in Argentina.)** [English summary ⅓ p.]
Rev. Fac. Agron. La Plata, 1950, **27**: 275-81, bibl. in text, illus.
A new disease of the ornamental pepper tree (*Schinus molle*) is reported from Argentina. Long black spots which develop into cankers appear on the branches and twigs of affected trees, while the leaves show circular, light brown spots surrounded by a dark brown ring. The morphology and biology of the causal fungus, *Myxosporella schini*, are described.

3903. Struckmeyer, B. E.
Blossom bud induction and differentiation in hydrangea.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 410-14, bibl. 5, illus.
Plants with a large foliage area and thick stem diameter grown under the proper environmental conditions are receptive to blossom induction. Induction of blossom buds occurred approximately two weeks before primordia could be observed microscopically. The primordia differentiated flower parts during the dormant period, so that when they were placed under conditions for forcing, the flower parts enlarged into a mature inflorescence. [Author's summary.]—Wis. agric. Exp. Stat.

3904. Shanks, J. B., Haun, J. R., and Link, C. B.
A preliminary study on the mineral nutrition of hydrangeas.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 457-65, bibl. 5, illus., being *Sci. Pap. Md agric. Exp. Stat., Dep. Hort.*, **A264.**
Hydrangeas of the variety Gertrude Glahn were grown in a greenhouse during the forcing period under 12 combinations of low, medium and high amounts of N, P and K applied to the soil. Aluminium sulphate was applied to half the plants in each treatment. Quantitative analyses of leaves and stems, tissue tests and rapid soil tests were carried out, the first giving the most consistent correlations with fertilizer applications and plant responses. For the production of pink flowers the most satisfactory levels, as indicated by leaf analysis, were medium N and P and medium to high K. For the production of blue flowers the best levels were medium N, low P and medium and high K, with the addition of Al. High P, in the presence of N, resulted in weak stems and in a breakdown of peduncular tissue. The pH of the soil had less effect on flower colour than did the relative levels of N, P and K. In a trial on the rooting of leaf bud cuttings the greatest production of roots occurred in cuttings taken from plants receiving medium N, low P and high K.

3905. Pape, H.
Viruskrankheiten auch bei Hortensien ? **(Virus disease of hydrangea.)**
Reprinted from *Gartenwelt*, 1951, **51**: 137-8, illus.
The symptoms of a virus disease of hydrangea are irregular pale green spots on the leaves. Large spots sometimes occur where small spots coalesce and the leaves become curled. Sometimes the flowers turn green. Until further study has been made the only recommendation for control is to remove all infected plants as soon as they are noticed and not to propagate from such plants.

3906. Blumer, S.
Das epidemische Auftreten eines Oidiums auf *Syringa vulgaris* L. **(The epidemic outbreak of an oidium on lilac.)**
Phytopath. Z., 1951, **17**: 478-88, bibl. 10, illus.
A powdery mildew of lilac observed in 1939 in France and now spreading epidemically in Switzerland is described. The same fungus has been found in England and in Spain. Its nomenclature is discussed.

3907. Fedorov, A. A.
The progressive character of the anomalies in the structure of the flower of *Lonicera alberti* Rgl. [Russian.]
Bot. Zurnal, 1951, **36**: 183-5, bibl. 9, illus.
Transitional forms of flowers of *Lonicera alberti* (a shrubby ornamental plant), from the regular actinomorphic form to the typical zygomorphic form, are described and drawn.

3908. Stern, F. C., and Taylor, G.
A new peony from S.E. Tibet.
J. roy. hort. Soc., 1951, **76**: 216-17.
The tree peony which has been provisionally known as *Paeonia lutea* " Tibetan form " is here named *P. lutea* var. *ludlowii* (Stern and Taylor) var. nov.

3909. Cox, R. S.
Control and overwintering studies on pyracantha scab disease, *Fusicladium pirinum* var. *pyracanthae* in Delaware.
Abstr. in *Phytopathology*, 1951, **41**: 560.
The perfect stage of the fungus was not found on either attacked or fallen leaves: this suggests that the organism survives the winter only in the vegetative state. Among a number of fungicides tested the best control was obtained with bordeaux mixture (4-4-100) and Agricultural Puratized, but bordeaux caused severe defoliation and unsightly fruit, while Puratized inhibited normal fruit coloration but caused no apparent foliage injury.

3910. Kretovič, V. L., and others.
Investigating the germination of the seed of the verrucose spindle tree. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 527-30, bibl. 6.
To overcome the very slow germination of the seed of

the verrucose spindle tree, *Euonymus verrucosa*, stratification has to be employed. The chemical changes which take place in the seed during stratification were investigated and the results are here tabulated and described.

3911. Burgos, J. C.
Tratamiento con ácido sulfúrico de semillas de *Gymnocladus dioica* L. cosechadas en Mendoza. **(Sulphuric acid treatment of the seeds of *Gymnocladus dioica* in Mendoza.)** [English summary 8 lines.]
Rev. Fac. Cien. agrar., 1949, **1**: 61-5, bibl. 5, illus. [received Dec. 1950].
The seeds of the ornamental Kentucky coffee tree, *Gymnocladus dioica*, are very hard and have a low natural rate of germination. In the United States it has been found that 86% germination can be obtained by soaking the seed in concentrated sulphuric acid for 2 hours. This treatment, applied to seeds collected in Mendoza, only resulted in 5-15% germination. This result is attributed to the greater impermeability of the seeds caused by low atmospheric humidity. Percentage germination was increased, to a maximum of 75%, with increase in length of treatment up to 18 hours. Treatment for periods longer than 18 hours resulted in reduced germination.—Nat. Univ. Cuyo, Argentina.

3912. Kerr, T. W., Jr.
Several injurious ornamental and shade tree insects and their control.
J. econ. Ent., 1951, **44**: 234-40, bibl. 8, being *Contr. R.I. agric. Exp. Stat.* **770.**
During 1950 the comparative insecticidal effectiveness of petroleum oil, lime-sulphur, lead arsenate, nicotine sulphate and several chlorinated hydrocarbons, and the timing of the application of these substances were investigated in field trials on 8 insects which attack ornamental trees and shrubs.

Turf.

(*See also* 3916f, h.)

3913. Harris, G. S.
Note on control of earthworms in greenkeeping.
N.Z. J. Sci. Tech. Sect. B., 1949 (issued Feb. 1951), **31**: 3: 40.
Under New Zealand conditions, for convenience of application, effectiveness, economy, and relative non-toxicity to other animals, the use of derris dust on greens appears to have decided advantages over other methods for controlling earthworms.

3914. Adams, J. A.
Tests with dieldrin for control of Japanese beetle larvae in turf.
J. econ. Ent., 1951, **44**: 127-8, bibl. 3, being *J. Pap. N.Y. St. agric. Exp. Stat.* **845.**
Dieldrin, highly diluted with talc, applied dry to long-established turf on poorly drained, compact soil, at the rate of 2·7, 5·4 and 10·8 lb. per acre in 1949, gave complete control of Japanese beetles, *Popillia japonica*, by October.

3915. Neiswander, C. R.
Duration of the effectiveness of lead arsenate applied to turf for white grub control.
J. econ. Ent., 1951, **44**: 221-4, bibl. 1.
Lead arsenate applied to the soil in 1935 at levels of 5, 10, 20 and 30 lb. per 1,000 sq. ft. was highly effective in controlling white grubs at all levels through the first 5-year period. In the two succeeding 5-year periods the 30 lb. level continued to maintain its original effectiveness, but all other levels showed a gradual decline in white grub control. Soil analyses made at intervals showed a corresponding decline in arsenic content, but the arsenic content of the soil at the 30 lb. level was still high enough in 1947 to give a very high degree of control. [Author's summary.]

Noted.

3916.

a Aberconway, Lord.
Rhododendron hybrids.
J. roy. hort. Soc., 1951, **76**: 257-64, illus.

b Beaumont, A.
Diseases of violets.
Gdnrs' Chron., 1951, **129**: 197.

c Beaumont, A.
Diseases of violas and pansies.
Gdnrs' Chron., 1951, **130**: 33-4.

d Beaumont, A.
Diseases of wallflowers and stocks.
Gdnrs' Chron., 1951, **130**: 4.

e Beaumont, A.
Sweet pea diseases.
Gdnrs' Chron., 1951, **129**: 132.
Description of symptoms followed by recommendations for control.

f Boyce, J. H.
The construction and care of lawns.
[*Publ.*] *Canada Dep. Agric.*, revised 1950, pp. 22.

g Cox, C. E., and Lewis, C. E.
A fusarium bud rot of chrysanthemums.
Abstr. in *Phytopathology*, 1951, **41**: 560.

h Cuny, L.
Les gazons: considérations sur leur création et leur entretien. **(Lawns: their establishment and maintenance.)**
Rev. hort. Paris, 1951, **123**: 479-86, illus.

i Doorenbos, J.
The history of the "Persian cyclamen".
Meded. LandbHoogesch. Wageningen, 1950, **50**: 32-59, bibls. numerous, illus., being *Publ. Lab. Tuinbouwpl. LandbHoogesch.* **88.**

j Doorenbos, J.
Taxonomy and nomenclature of cyclamen.
Meded. LandbHoogesch. Wageningen, 1950, **50**: 17-29, bibl. 27, illus., being *Publ. Lab. Tuinbouwpl. LandbHoogesch.* **87.**

k EMSWELLER, S. L.
Recent developments in lily breeding techniques.
Proc. Amer. Soc. hort. Sci., 1950, **56**: 498-508, bibl. 33.

l JANAKI AMMAL, E. K.
Chromosomes and the evolution of garden philadelphus.
J. roy. hort. Soc., 1951, **76**: 269-75, bibl. 3, illus.

m KERLING, L. C. P.
The gregarious flowering of *Zephyranthes rosea* Lindl.
Ann. bot. Gdns, Buitenzorg, 1941, **5**: 1-42, bibl. 67, illus. [received 1950].

n MORGAN, D. T., Jr., AND RAPPLEYE, R. D.
Polyembryony in maize and lily following X-irradiation of the pollen.
J. Hered., 1951, **42**: 91-3, bibl. 11, illus.

o VAN DER PIJL, L.
Flagelliflory and cauliflory as adaptations to bats in Mucuna and other plants.
Ann. bot. Gdns, Buitenzorg, 1941, **5**: 83-93, bibl. 14, illus. [received 1950].

p POSTHUMUS, O.
Malayan fern studies. III. The ferns of the Lesser Sunda Islands.
Ann. bot. Gdns, Buitenzorg, 1944, Vol. Hors Série, pp. 35-113 [received 1950].

q RADA, E. L.
Some problems of marketing Hawaiian floricultural products on the mainland.
Agric. Econ. Rep. Hawaii agric. Exp. Stat. **4**, 1951, pp. 12.

r ROUFFA, A. S., AND GUNCKEL, J. E.
A comparative study of vegetative shoot apices in the Rosaceae.
Amer. J. Bot., 1951, **38**: 290-300, bibl. 40, illus.

s ROUFFA, A. S., AND GUNCKEL, J. E.
Leaf initiation, origin, and pattern of pith development in the Rosaceae.
Amer. J. Bot., 1951, **38**: 301-7, bibl. 23, illus.

t SEVERIN, H. H. P.
***Texananus incurvatus*. II. Transmission of California aster-yellows virus. III. Life history on virus-infected and on healthy plants.**
Hilgardia, 1950, **19**: 544-5, bibl. 2, and 546-8, bibl. 3.

u TAYLOR, G.
Two new meconopsis hybrids.
J. roy. hort. Soc., 1951, **76**: 231-2, illus.

v WALP, R. L.
Fern prothallia under cultivation for twelve years.
Science, 1951, **113**: 128-9, bibl. 2.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 3969.)

3917. REBOUR, H.
L'engrais vert permanent dans les vergers irrigués. **(Permanent cover crops in irrigated orchards.)**
Rev. hort. Paris, 1951, **123**: 492-3, illus.

The advantages are discussed of maintaining a permanent weed cover, possibly supplemented with sowings of beans, mustard or cereals, in irrigated, sub-tropical orchards. This system is being tested in a grove of clementines at the Boufarik Research Station, and the preliminary results have been promising.

3918. MARZOCCA, A.
Las plantas cultivadas en la República Argentina: Ebenáceas. **(Plants grown in the Argentine Republic: Ebenaceae.)**
[*Publ.*] *Minist. Agric. B. Aires*, 1950, Vol. **8**, No. 158, pp. 22, bibl. 45, illus.

Four members of the Ebenaceae are grown in Argentina, either for fruit production or for ornament. These are *Diospyros lotus*, *D. virginiana*, *D. kaki* and *Maba inconstans*. Botanical descriptions and illustrations are given of each species, together with notes on their horticultural characteristics and uses.

3919. DE LOTTO, G.
Osservazioni sulla biologia del *Phymateus viridipes* St. (Orth. Acrididae). **(Observations on the biology of *Phymateus viridipes*.)**
Riv. Agric. subtrop., 1951, **45**: 8-18, bibl. 2, illus.

The locust *Phymateus viridipes*, its life history, the damage it causes, geographical distribution, parasites and predators, are described. In the list of plants on which it feeds are included many horticultural crops, e.g. vine, fig, *Citrus* spp., papaw, mango, pomegranate, loquat (*Eriobotrya japonica*), peach, apple, tomato and tobacco.

Avocado.

3920. YAZICIOGLU, T.
Zusammensetzung und Beschaffenheit der Avocatbirnen aus Adana (Türkei) und die Eigenschaften und Kennzahlen des daraus gewonnenen Öles. **(Composition and characters of the avocado pear in Adana (Turkey), and the properties and constants of the extracted oil.)**
Fette u. Seifen, 1951, **53**: 1: 9-10, from abstr. in *Oléagineux*, 1951, **6**: 386.

The chemical composition of the fruit is recorded. It contains up to 73·18% oil, with an iodine value of 87·2. The oil contains 16·8% saturated fatty acids, 65·5% oleic acid and 17·7% linoleic acid.

Citrus.

(*See also* 3349, 3496, 3964, 4107, 4110, 4122, 4137, 4141.)

3921. [CITRUS FRUIT ADVISORY COMMITTEE.]
The national program of citrus investigations.
Calif. Citrogr., 1951, **36**: 353, 366.

A citrus fruit advisory committee has reviewed the

work of the U.S. Department of Agriculture and in this article their recommendations for research on production, utilization and marketing are set forth. Under production it is considered that work on tristeza disease, rootstock testing and control of the Mexican blackfly and Oriental fruit fly are of the greatest importance. Other important lines of research are breeding for flavour, colour and high soluble solids; fruit setting; nematode control; weed control.

C.W.S.H.

3922. LAMBOUR M., R.
El cultivo del naranjo. **(Orange growing [in Guatemala].)**
[*Publ.*] *Minist. Agric. Guatemala* **29**, 1950, pp. 51, bibl. 19, illus.

About 95% of the oranges grown in Guatemala are of a native variety which is probably a degenerated form of Valencia. They are very largely grown from seed. It is recommended that the varieties Jaffa, Valencia, Washington Navel and Rubi should be more widely used and that selected material of the native variety should be propagated vegetatively. The rootstock which has so far given the most satisfactory results is the sour orange, and as tristeza disease has not yet appeared in the country it is recommended for general use. Detailed information is given to growers on propagation, planting, irrigation and other cultural practices, including preparation for market, control of pests and diseases and recognition of mineral deficiency symptoms.

3923. TRAVINA, O. K., AND LARIONOVA, A. A.
Citrus agrotechnique in the foothill zone of the Crimea. [Russian.]
Sad i Ogorod, 1951, No. 6, pp. 41-2.

In the foothill and steppe regions of the Crimea the winters are so severe (temperatures as low as −26° to −30° C.) that citrus species need special protection. Experiments at the Crimea horticultural experiment station are mentioned, in relation particularly to the growing of lemons in trenches, 90 cm. deep for prostrate forms and 150 cm. for dwarf forms.

3924. NOTTAGE, I. L.
A lemon orchard near Auckland.
N.Z. J. Agric., 1951, **82**: 391-6, illus.

This is an account of a New Zealand orchard devoted almost entirely to growing lemons. The lay-out, windbreaks, cultivation, manuring and pruning are described. Trees on *Poncirus trifoliata* are smaller than the rest, and there is evidence that the trees on this stock need more phosphorus than those on island sweet orange seedlings which have retained their vigour and productiveness.

3925. VASILJCOVA, T. M.
Somatic fertilization in *Citrus* spp. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1951, No. 3, pp. 18-39, bibl. 22, illus.

This is an account of the initiation of polyembryony in three species of citrus (the orange variety Luĭšiĭ Suhumskiĭ, the pear-shaped shaddock and the Washington navel), and of the behaviour of the surplus pollen tubes which enter the nucellus and are associated with the production of nucellar embryos.

3926. PARKER, E. R., AND JONES, W. W.
The use of organic materials in long-term experiment.
Calif. Citrogr., 1951, **36**: 314, 331-2, bibl. 4.

This is an outline account of a long-term manurial and cover crop experiment which is described in full in *Bull.* 722 of the California Agricultural Experiment Stations. Washington Navel oranges on sweet orange stocks were grown on loam soil of granitic origin. Winter cover crops gradually increased yields until a 20-30% increase was obtained after 12 years. Addition of cattle manure without further supplies of nitrogen depressed yields in the first 12 years owing to the temporary reduction of nitrate nitrogen in the soil at time of fruit setting. In the following 9 years the N application rate was increased from 1 to 3 lb. a tree, and cattle manure gradually ceased to have a depressing effect on yield. The highest yield was obtained when half the N was supplied in the cattle manure and half in urea. Cattle manure had a beneficial effect on soil structure while fertilizers alone had an adverse effect. The results of cattle manure and other organic dressings indicated that the most important consideration was the ratio of organic matter to total N supplied. The most productive ratio was 20: 1, giving a C/N ratio of 10: 1. Covers and organic manures increased fruit size. This was due to improved soil structure and water holding capacity, and to the supply of potassium in the organic manures.

C.W.S.H.

3927. MANDEL, K.
Studies on the vitality of citrus branches.
Bull. Rehovot agric. Res. Stat. **57**, 1950, pp. 109+23, bibl. 85.

Investigations into the causes of decline of shamouti orange trees showed that in declining branches there was a distinct boundary between the live and dead tissue in the phloem but not in the xylem. Microscopical examinations showed damaged protoplasm in the cambium and phloem. Respiration rate and phosphorus content of declining branches were low. It was concluded that 70 p.p.m. was the critical level of phosphorus content. It is suggested that phosphorus deficiency is associated with the accumulation of starch in the bark of declining branches. Suggestions are made for different methods of pruning according to the starch content of the branches. It is concluded that decline is primarily caused by water shortage or nutrient deficiency, particularly that of phosphorus.

C.W.S.H.

3928. EREMEEV, G. N.
The effect of soil conditions on the growth and transpiration of citrus seedlings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **78**: 1243-6, bibl. 10.

Observations in relation to attempts to extend citrus culture in the Crimea were made on seedlings of 6 species of citrus grown in pots and in trial plots with 3 types of Crimean soil, viz. (1) mountain-meadow soil, (2) brown-woodland soil, (3) carbonated brown soil. The best growth was in (2) and the poorest in (3). Data are tabulated and discussed for the growth of the 6 varieties in the 3 soils with different soil and air

temperatures, and for their transpiration during the months of August, October, and November.

3929. Blasenko, I. A., and Domrovskaja, M. V.
The dynamics of carbohydrates in citrus grown in trenches. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **77**: 125-7, bibl. 10.
Experiments are described with graphs to show the variations in sugar and starch content of leaves during winter of 2 varieties of lemon, one of mandarin, and the Washington Navel orange grown in trenches, some with access of light, others shaded.

3930. Hilgeman, R. E.
Irrigation of Valencia oranges.
Calif. Citrogr., 1951, **36**: 370-2.
Valencia orange plots in an Arizona experiment received heavy, moderate and light irrigation, light irrigation in alternate rows, moderate irrigation predominantly in spring and moderate irrigation predominantly in autumn. Fruit number was reduced by the light irrigation and the predominantly autumn irrigation. Heavy, frequent irrigation increased fruit size, but, where fruit number had been decreased by very light irrigation, fruit size was maintained. Fruit size was reduced by low autumn irrigation. The effects of irrigation on juice percentage and composition, and on the growth of the fruit in late summer, were also recorded. There was no effect on the N and P contents of the leaves. C.W.S.H.

3931. Bitters, W. P., and Parker, E.R.
Rootstock investigations.
Calif. Citrogr., 1951, **36**: 313, 329-30, bibl. 4, illus.
This is a progress report from the California Citrus Experiment Station on the susceptibility to quick decline disease of various stock-scion combinations. Plantings of these combinations were made in 1945-6 and 1948. Some plants were inoculated with buds from diseased trees; the remainder were exposed to natural infection. Details are given of the observations made on the effect of inoculation on each stock, but no final conclusions can yet be drawn. Most of the inoculated trees made less growth than the uninoculated, but trees on some lime and rough lemon stocks have not been stunted. C.W.S.H.

3932. Grant, T. J., Costa, A. S., and Moreira, S.
Tristeza disease of citrus in Brazil.
Calif. Citrogr., 1951, **36**: 310-11, 324-9, bibl. 10, illus.
Attention is drawn to the similarity of the decline disease associated with stem pitting in South Africa and tristeza disease in Brazil. Similar stem pitting has been found to be associated with tristeza disease on several citrus species. After stem pitting has been noticed, the presence of tristeza disease may be confirmed by using the Key lime as an indicator plant. Key lime seedlings show early symptoms such as vein clearing, etc. The reactions of grapefruit, limes and lemons to tristeza are discussed. It has lately been found that some trifoliate hybrid rootstocks have failed to give protection to sweet oranges in tristeza infected areas. C.W.S.H.

3933. Kiely, T. B.
Control and epiphytology of black spot of citrus on the central coast of New South Wales.
Sci. Bull. N.S.W. Dep. Agric. **71**, 1950, pp. 88, bibl. 27, being *Contr. biol. Branch, Dep. Agric., N.S.W.*, **360.**
Applications of bordeaux mixture alone for the control of citrus black spot [*Phoma citricarpa=Guignardia citricarpa* (*H.A.*, 19: 3370, 3371, 3372)] have produced undesirable effects on the tree as well as on the quality of the late Valencia orange. White spraying oils at 1 in 160 improved the efficiency of bordeaux mixture when used as a supplement. The effect of white spraying oil is more marked on young vigorous Valencia orange trees than on old, less vigorous trees. Commercial control of black spot was obtained on an 11-year-old block of Valencia orange trees with two applications of bordeaux mixture combined with a white oil spray for scale insect control.

3934. Baines, R. C.
Nematodes on citrus. Soil fumigation and resistant citrus varieties promising as controls.
Calif. Agric., 1950, **4**: 8: 7, from abstr. in *Helminth. Abstr.*, 1951, **19**: 299.
A number of species and varieties of *Citrus* and nearly related genera have been tested for resistance to nematodes. Most are susceptible; some strains of *Poncirus trifoliata* are highly resistant; 4 species of tree related to citrus are immune, viz. *Balsamocitrus dawei*, *Clausena lansium*, *Murraya paniculata* and *Severinia buxifolia*. Some may be useful in breeding nematode resistant rootstocks for citrus, and breeding work is being done. No chemical can yet be recommended for control of nematodes on living citrus trees. Fumigation of infested soil in the field has not proved reliable.

3935. Boyce, A. M.
Entomology of citrus and its contribution to entomological principles and practices.
J. econ. Ent., 1950, **43**: 741-66, bibl. 160, being *Pap. Calif. Citrus Exp. Stat.* **656.**
This presidential address to the 61st annual meeting of the American Association of Entomologists is concerned with the significant contribution to entomology made by the study of citrus problems. The history of identification and the development of remedial measures is summarized, and eradication campaigns against citrus white fly, Mexican fruit fly, Mediterranean fruit fly, citrus black fly and the white snail are outlined. A résumé is given of the successful biological control of cottony-cushion scale, mealybugs, citrus blackfly and black scale, and chemical control including the use of fumigants and systemic insecticides is discussed. Note the extensive bibliography.

3936. Cooper, J. F., Plummer, C. C., and Shaw, J. G.
The citrus blackfly situation in Mexico.
J. econ. Ent., 1950, **43**: 767-73, bibl. 26.
The history of the citrus blackfly, *Aleurocanthus woglumi*, in Mexico is briefly outlined. Species of *Citrus* are the most favoured hosts, but other plants

that are often heavily infested include mango, cherimoya, persimmon, pear, quince, coffee and myrtle. The important parasite *Eretmocerus serius* appears to be repressed by the long dry season except in a small coastal area in Colima. The most satisfactory insecticide was found to be an emulsion of 1·67 gal. of light-medium oil containing 4·5 oz. of cubé root (5% rotenone) per gal. of oil made up to 100 gal. with water. Parathion, while very effective, is restricted in use because of its toxicity to man.

3937. SIMMONDS, H. W.
Observations on the biology and natural control of the black scale of citrus, *Saissetia oleae* (Bern.), in South Australia.
J. Dep. Agric. S. Aust., 1951, **54**: 339-42, bibl. 4, illus.

This is an account of observations made on an olive plantation near Adelaide, and describes the life history of the scale, the discontinuity in its populations, and the climatic and biotic factors (predator or parasites) limiting its numbers, in South Australia. Seasonal weather, particularly the incidence of hot dry spells in summer, is regarded as the principal factor in producing seasonal fluctuations in the population of black scale under local conditions.

3938. SIMMONDS, H. W.
The establishment of the black scale parasite *Metaphycus helvolus*, Compere (Hymenoptera, Encyrtidae) in South Australia.
J. Dep. Agric. S. Aust., 1951, **54**: 398-400, illus.

In order to control black scale (*Saissetia oleae*) in South Australia, a colony of *Metaphycus helvolus* was obtained from California in 1942. It was bred in the laboratory and released during 1943-7. Its host preferences, methods of propagation and life history are described. A coloured plate shows how to distinguish this from two other species of *Metaphycus*.

3939. YUST, H. R.
Tests of liquefied-gas aerosols used in conjunction with hydrocyanic acid fumigation to control citrus red mite.
J. econ. Ent., 1950, **43**: 945-6. bibl. 2.

The distribution of aerosols under tent-covered trees has not given effective control of the citrus red mite, *Paratetranychus citri*.

3940. DEBACH, P., FLESCHNER, C. A., AND DIETRICK, E. J.
Studies of the efficacy of natural enemies of citrus red mite in Southern California.
J. econ. Ent., 1950, **43**: 807-19, bibl. 12, being *Pap. Calif. Citrus Exp. Stat.* **655.**

Studies in citrus orchards which had received no insecticidal applications for 3 to 10 or more years indicated that predators were mainly responsible for limiting citrus red mite, *Paratetranychus citri*, populations. The most effective, in approximate order of importance, were: Coniopterygidae (several species), *Stethorus picipes*, *Chrysopa californica*, Coccinellidae (several polyphagous species), and *Somatium oviformis*. Cyclical trends evident in citrus red mite and predator populations in Orange County are given.

3941. BOTTGER, G. T., AND YERINGTON, A. P.
Comparative toxicity of tetraethyl dithiopyrophosphate, tetraisopropyl pyrophosphate, and parathion.
J. econ. Ent., 1951, **44**: 261-2, bibl. 2.

A brief report on trials carried out against citrus red mite and other insects and effects of treatments on the green foliage of a number of vegetables.

3942. DEBACH, P., AND OTHERS.
Periodic colonization of *Aphytis* for control of the California red scale. Preliminary tests, 1949.
J. econ. Ent., 1950, **43**: 783-802, bibl. 6, illus., being *Pap. Calif. Citrus Exp. Stat.* **654.**

A satisfactory degree of commercial control of California red scale, *Aonidiella aurantii*, was obtained in citrus orchards through periodic colonizations with *Aphytis chrysomphali* and *Aphytis* "A" in 1949. The relative value of the two species varied with environmental conditions. The presence of Argentine and certain other ants was detrimental to the control exercised. It is considered that colonizations are most effective during the periods 15 February to 15 April, 15 June to 15 July, and 15 August to 15 October.

3943. ATKINS, E. L., Jr.
Spray tests on citrus to control fruit tree leaf roller.*
J. econ. Ent., 1951, **44**: 82-7, bibl. 4, being *Pap. Calif. Citrus Exp. Stat.* **658.**

In trials in California to control the fruit tree leaf roller, *Archips argyrospila*, DDT, TDE, parathion and *para*-nitrophenyl thionobenzenephosphonate were effective, while methoxychlor, aldrin and dieldrin were less satisfactory. Of the mechanized spray-application equipment used, a speed sprayer afforded the most uniform tree coverage, followed closely by a boom sprayer and by a spray-duster.

3944. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.
The "Dicky Rice" weevil (*Maleuterpes spinipes*).
Agric. Gaz. N.S.W., 1951, **72**: 42-3, 52, illus.

This weevil—a native species—is a serious pest of citrus in some central coast districts of New South Wales. The adult weevils feed on the skin of the fruit, particularly in the early stages of its development. They also feed on foliage, particularly the young tender growth. The weevil and its life-cycle are described. For control, the trunks should be banded with a sticky material, or spray applications of cryolite (1¼ lb. to 40 gal.) should be given during the period when the weevils are active. DDT sprays at 0·05% have given control when applied in spring.

3945. WENE, G. P.
Sunflower moth larva injuring young citrus.
J. econ. Ent., 1950, **43**: 948.

Sunflower moth larvae, *Homoeosoma electellum*, in a citrus grove in Texas were eliminated by aeroplane dusting with 5% DDT at 30 lb. per acre.

* See also *H.A.*, 21: 2938.

3946. DeBach, P., Dietrick, E. J., and Fleschner, C. A.
Ants *vs.* biological control of citrus pests.
Calif. Citrogr., 1951, **36**: 312, 347-8, bibl. 15, illus.

Failure to control ants leads to an increase in the populations of scale insects, mealybugs and aphids, where biological control of these insects is being attempted. The ants prevent the development and free movement of parasites and predators such as ladybird larvae, lacewings, and small hymenopterous parasites. The Argentine ant has been particularly troublesome in this respect. C.W.S.H.

3947. Griffiths, J. T., Stearns, C. R., Jr., and Thompson, W. L.
Parathion hazards encountered spraying citrus in Florida.
J. econ. Ent., 1951, **44**: 160-3, bibl. 1.

Prolonged exposure appeared to be the major contributing factor to the 25 instances of parathion poisoning which occurred during 1950. The primary route of entry was through the skin. It is recommended that spray personnel in citrus groves should not be exposed to parathion sprays for more than a week at a time and that at least a week's interval should occur between exposure periods.

3948. Bartholomew, E. T., Stewart, W. S., and Carman, G. E.
Some physiological effects of insecticides on citrus fruits and leaves.
Bot. Gaz., 1951, **112**: 501-10, bibl. 18.

Experiments were carried out to determine the effect of DDT, parathion and oil sprays on juice quality and ascorbic acid content of oranges and grapefruits, and on dry matter content of orange leaves. The comparisons were largely between the relative effects of these insecticides, since in most cases there were no controls. Oil sprays caused a significant reduction of the concentration of total soluble solids when compared with DDT and parathion sprays. Ascorbic acid content of DDT treated fruit was higher than that of oil treated fruit. Oil spraying reduced the dry matter content of orange leaves. There was some indication that the addition of 2,4-D to the oil nullified this effect. C.W.S.H.

3949. McCready, R. M., Walter, E. D., and Maclay, W. D.
Sugars of citrus juices.
Food Technol., 1950, **4**: 19-20, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **A.I.C.-218,** Suppl. 5, p. 3.

Analyses for sugars in lemon, orange and grapefruit juices by paper chromatography showed the presence of only sucrose, glucose and fructose. Their identities were confirmed by independent means. Nearly 100% of the solids from deionized, lyophilized Valencia orange juice was accounted for by analysis.

3950. Roper, B. E., and Miller, E. V.
The effects of some special treatments in the degreening of Florida oranges as measured by respiration rate.
Plant Physiol., 1951, **26**: 244-57, bibl. 30, illus.

Ethylene treatment of early oranges to remove the green pigment from the rind tends to accelerate some of the biological processes in the fruit and may shorten the period of marketability. In order to overcome this difficulty the effects of ethylene and other possible degreening treatments on the rate of respiration in oranges were studied, using specially designed chambers. Several growth-modifying substances, applied either as an aerosol spray or as a vapour, did not appreciably affect the rate of degreening or the rate of respiration. When certain volatile organic compounds were applied either as a pre-treatment or in conjunction with ethylene, no effect on degreening was noted, but there appeared to be a slight increase in respiration rate over that caused by ethylene alone. However, this increased rate of respiration was observed only during the 3-, 6- and 9-hour determinations and did not appear in the 24-hour readings. Treatments with radio-frequency radiations definitely accelerated respiration without affecting the rate of degreening. An attempt was made to explain the observations recorded in these experiments by assembling what has been reported on the effects of ethylene on the physiology of the plant cell and especially the chloroplasts, thus postulating a theory which presents a comprehensive picture of the mechanisms involved in the loss of chlorophyll during the degreening of oranges.—Univ. Pittsburgh, Pa.

3951. Archovskaja, E. V., and Rubin, B. A.
Organic peroxides as a possible source of oxygen for the respiration of certain plant tissues. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **74**: 99-102, bibl. 6.

Data are tabulated for lemon fruits. The observations recorded indicate that the formation of peroxides may serve as one definite way of providing oxygen in those plant tissues to which access of molecular oxygen is difficult. This refers particularly to the internal layers of fleshy tissues of the pericarp of fruits and the parenchyma of fleshy roots and tubers.

3952. Young, R. E., Pratt, H. K., and Biale, J. B.
Identification of ethylene as a volatile product of the fungus *Penicillium digitatum.*
Plant Physiol., 1951, **26**: 304-10, bibl. 15, illus.

A simplified method is described for the accumulation and identification of the small concentrations of ethylene which may be produced by plant materials. Using this technique ethylene was identified as a volatile product of the common green mould of citrus fruits, *Penicillium digitatum*.—Univ. Calif., Los Angeles, and Div. Truck Crops, Davis, Calif.

3953. Rose, D. H., Cook, H. T., and Redit, W. H.
Harvesting, handling, and transportation of citrus fruits. A digest of information on the subject published mostly from 1938 to 1948.
Bibl. Bull. U.S. Dep. Agric. **13**, 1951, pp. 178, U.S. Govt. Printing Office, Washington, D.C.

This bibliographical digest is the second in a series [for the first, on potatoes, see *H.A.*, 20: 2880] and contains: Introduction including kinds and varieties

of citrus fruits grown commercially in the main producing areas of the world, bibl. 10; harvesting and handling (in the United States and in other countries), bibl. 21; small sizes, bibl. 10; hormones, bibl. 7; degreening, bibl. 20; grading, bibl. 4; packaging and packing, bibl. 14; storage, bibl. 79; maturity and quality, bibl. 54; composition, bibl. 97; vitamins, bibl. 100; transport, bibl. 34; post-harvest diseases and their control, bibl. 201; and insect damage affecting market quality, bibl. 10.

3954. ANON.
Citrus oils from the Punjab.
Perfumery ess. Oil Rec., 1950, **41**: 179, from abstr. in *DocumBl. trop. Prod. Amst.*, 1951, **5**: 467.
Results are reported of analyses of the essential oils of sweet and bitter oranges and grapefruit from the Punjab.

Dates.

3955. NIXON, R. W.
Imported varieties of dates in the United States.
Circ. U.S. Dep. Agric. **834**, 1950, pp. 144, bibl. 69, illus.
Early attempts to raise date palms from imported seeds were nearly all failures and soon gave way to the importation of offshoots from Algeria, Iraq and Egypt. Commercial importations followed experimental ones and resulted in the establishment of commercial date culture in southern California and Arizona. The varieties found in the United States have been grouped in this paper into commercial varieties, minor varieties and other varieties, and a key for identification is given. A detailed botanical description of the date palm (*Phoenix dactylifera*) is given, and this is followed by detailed descriptions of 44 commercial and minor varieties and notes on 105 other varieties. C.W.S.H.

Macadamia nut.

3956. EVERETT, P.
Queensland nut tree culture in New Zealand.
N.Z. J. Agric., 1950, **81**: 527, illus.
Culture of the Queensland nut tree, *Macadamia ternifolia*, in New Zealand is described briefly. Trees in Northland are producing good crops annually. A few seedling trees are growing in several parts of the Auckland Province, but most are at Kerikeri in Bay of Islands County, where good crops of high-quality nuts have been produced for the past 5 years. Propagation in New Zealand has so far been by seed, about 70% germination generally being obtained from freshly-harvested nuts. Before planting, the pericarps (but not the shells) should be removed and the nuts planted on their sides and covered with about 1½ in. of friable soil. Seedlings are planted out when 2 or 3 years old at 22 to 28 ft. on the square. Until better-fruiting, more uniform types are available, the tree cannot, however, be recommended for commercial planting in New Zealand.

Tung oil.

3957. WORMS, P.
L'huile de bois de Chine dans l'union française. **(Tung oil production in the French territories.)**
Oléagineux, 1951, **6**: 495-8, illus.
In Madagascar the industry is growing with some 4,000 ha. under tung (*A. fordii*) in 1951. In the Cameroons tung is popular among the natives, who probably have some 300,000 to 400,000 very mixed trees, among which *A. montana* does best. There is urgent need for an experimental station to select good types and to study cultivation problems. While the future naturally depends on the amount of oil which China continues to send, there is every reason for continued attempts by the oil research institute [I.R.H.O.] to encourage the cultivation of tung oil in Madagascar, the Cameroons and Guinea in the immediate future.

3958. GODOY, C., Jr.
Tungue: caracterísṭticos biométricos dos frutos e correlações. **(Tung: biometric characteristics of the fruit and correlations.)**
Rev. Agric. Piracicaba, 1950, **25**: 37-46, bibl. 5.
A statistical study was made of the size, density and form of small and large fruits of tung, of their relative proportions of husk, integument and kernel, and of the percentage of oil in each portion. The following results, among others, are reported: small fruits contain a higher proportion of seed and kernel than large fruits; there is no difference in the quantity of oil obtained from large and small fruits, the latter containing a relatively higher percentage of oil; the percentage of oil in the fruit, seed and kernel of small fruit is more constant than in those of large fruit. Correlation coefficients were determined. [The measurements would appear to have been made on *A. fordii*.—ED.] Esc. sup. Agric. " Luiz de Queiroz ".

3959. GERŠTEĬN, L. A.
Metabolism in tung seeds during germination.
[Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **72**: 1091-4, bibl. 5.
An analytical study of chemical changes in the seeds of *Aleurites fordii* during germination, in relation to enzyme action.

3960. GILBERT, S. G.
A biochemical basis for copper-nitrogen balance in tung.
Plant Physiol., 1951, **26**: 398-405, bibl. 13, illus.
Previous work on tung [see *H.A.*, 16: 2189 and 18: 2158] has shown that a close relationship exists between the severity of copper deficiency and the amount of N supplied to the plant, copper-deficient material having a high protein content. In the present study an attempt was made to determine whether the high " protein " values obtained represent actual quantitative differences or a qualitative difference in protein composition. Thirteen amino acids were identified in leaf proteins, and evidence was obtained that the

proteins obtained from normal and deficient leaves were not widely different chemically. Preliminary data indicate that tung roots accumulate copper in direct relation to the copper supply and perhaps independently of the nitrogen supply. However, the nitrogen supply to the plant has an important effect in controlling the copper content of the leaves. It is suggested that copper deficiency does not directly influence nitrogen metabolism or protein synthesis. The nitrogen supply to the plant, however, influences copper metabolism by inactivation of copper ions by protein ions. The mass-action principle is considered to be a probable basis of the copper-nitrogen balance required in fertilization of tung trees.—Div. Fruit Veg. Crops and Diseases, U.S.D.A., Gainesville, Fla.

3961. IVANOV, S. M., AND IVANOVA, B. I.
The effect of functional disorders of tung trees on their resistance to high and low temperatures. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **72**: 1163-5, bibl. 7.

From the results of tests applied to leaves and twigs of *Aleurites fordii* it was found that trees suffering from functional disorders were more susceptible to leaf injury from high temperatures and twig injury from low temperatures than healthy trees.

3962. IVANOV, S. M.
The causes of withering in tung trees. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 187-90, bibl. 4.

A physiological disorder of tung trees in sub-tropical U.S.S.R. has been investigated at the Sukhum sub-tropical institute. The symptoms are a bronzing of the leaves and a downy appearance of their lower surface, chlorosis, necrosis of the tissues between the secondary veins, and a distortion of the petioles. In severe cases there is premature leaf drop, weak growth, small leaves and few shoots. A withering of individual twigs often shows in spring. Observations and experiments led to the conclusion that the disorder is not of virus origin and not due to lack of micronutrients, but that it is a result of inadequate soil aeration brought about by the poor soil structure and the periodical occurrence of high moisture content of the soil.

Noted.

3963.

a ALDRICH, D. G., VANSELOW, A. P., AND BRADFORD, G. R.
Lithium toxicity in citrus.
Soil Sci., 1951, **71**: 291-5, bibl. 3, illus., being *Pap. Calif. Citrus Exp. Stat.* **659.**
For abstract, see *H.A.*, 21: 2918 [from *Calif. Citrogr.*].

b ANON.
Oils from grapefruit oil.
Perfumery ess. Oil Rec., 1950, **41**: 184-6, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 467.
Analyses of the oil of various American grapefruit varieties.

c ANON.
Madagascar; la production de l'huile d'aleurite. **(The production of tung oil in Madagascar.)**
Bull. Inform. France d'Outre Mer, 1950, **145**: 52-3, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 492.

d BARTLETT, B. R., AND FISHER, T. W.
Laboratory propagation of *Aphytis chrysomphali* for release to control California red scale.
J. econ. Ent., 1950, **43**: 802-6, bibl. 4, illus., being *Pap. Calif. Citrus Exp. Stat.* **653.**

e BELL, S. A.
By-product distilled citrus oil.
Perfumery ess. Oil Rec., 1949, **40**: 205-9, bibl., from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 495.

f DICKSON, R. C., FLOCK, R. A., AND JOHNSON, M. M.
Insect transmission of citrus quick-decline virus.
J. econ. Ent., 1951, **44**: 172-6, bibl. 5, being *Pap. Calif. Citrus Exp. Stat.* **662.**
For abstract, see *H.A.*, 21: 2927 [from *Calif. Citrogr.*].

g EMERSON, O. H.
Bitter principles of citrus. II. Relation of nomilin and obacunone.
J. Amer. chem. Soc., 1951, **73**: 2621-3, bibl. 5, being *Contr. Enzyme Res. Div., Bur. Agric. ind. Chem., U.S. Dep. Agric.* **132.**
The compounds were isolated from citrus seed oil.

h PRUTHI, J. S.
Citrus fruit juice industry in India.
Indian J. Hort., 1950, **7**: 3/4: 21-5.

i RENAUD, M.
Memorandum du moniteur de taille. Cours de formation du chef du chantier de taille d'agrumes. **(Memorandum of the adviser on pruning. Instructions for the pruning of citrus.)**
Bull. Insp. gén. Dir. Agric. Algér. **160,** 1950, pp. 32.

TROPICAL FRUIT AND PLANTATION CROPS

General.

(*See also* 3185, 3526, 3775, 3778, 3779, 3831c, j, l, m, p, 3835, 3916o, q, 3919, 4080i, 4092, 4098, 4151, and annual report section.)

3964. WARD, K. M., AND FISHER-WEBSTER, K.
Maroochy Experiment Station.
Qd agric. J., 1951, **72**: 22-38, illus.

The Maroochy Experiment Station lies 3 miles from Nambour in the heart of the most important fruit district in Queensland. A description is given of the Station and its climate, topography and soils. The more important crops under investigation include pineapples, bananas, papaws, citrus, avocadoes, Macadamia nuts and ginger.

3965. PESSANHA, M. V. T.
Plano de trabalhos da Estação Agrícola Central. **(Research programme of the Central Agricultural Station, Angola.)** [English and French summaries ¼ p. each.]
Agron. angol., 1950, No. 4, pp. 105-11.

The Director of the Central Agricultural Station, Angola, briefly outlines its programme of work, which includes studies of the cost of production of the more important crops; cultivation experiments with coffee, oil palm, hevea, tung and bananas; improvement of *Coffea canephora, Elaeis* and *Hevea*; variety trials; the introduction and testing of new crops; and the distribution of seeds and plant material.

3966. STOREY, H. H.
Basic research in agriculture. A brief history of research at Amani, 1928-47.
EAAFRO, Nairobi, printed by E. Africa Standard Ltd., Nairobi, 1951, pp. 24, bibl. 36, illus.

Notable results of soil research at Amani concerned (1) the reasons adduced for the low fertility of the Usambar mountain soils which, in their natural state, were clothed with heavy tropical forest, (2) the effect of extensive grazing on the fertility of small areas of bananas and coffee at Bukoba on very poor soil. Plant collecting and surveys have resulted in a collection of 70,000 herbarium specimens. Much work has been done on the physiology of the coffee plant, and it was shown that overbearing results in starch depletion in the roots which prevents further large crops being produced. Breeding work with sisal has been directed to the production of plants which flower later and have a softer fibre. The species *Agave angustifolia* and *A. amaniensis* have been used for this purpose. Other research work described includes the prevention of leaf-curl disease of tobacco, the prevention or cure of tea "yellows" by the use of sulphur-containing fertilizers, and the control of the coffee pest *Antestia*.
C.W.S.H.

3967. KEEN, B. A.
The East African Agriculture and Forestry Research Organisation. Its origin and objects.
EAAFRO, Nairobi, printed by E. Africa Standard Ltd., Nairobi, 1951, pp. 12.

This research organization is now established, with headquarters at Nairobi, to carry out basic research in agriculture, forestry and animal husbandry for the East African territories and to test the knowledge gained under the different environmental conditions in East Africa. Examples are given of the basic research being undertaken, and it is shown that this cannot be "organized" in the same way as technological research is organized, and that it often leads to quite unexpected results and opens the way for new lines of study.
C.W.S.H.

3968. VERMAAT, J. G.
Aantekeningen over de stikstofhuishouding van tropische gronden. **(Notes on the nitrogen economy of tropical soils.)** [English summary 17 lines.]
Bergcultures, 1950, **19**: 437-41.

Investigations have shown that in highland plantation crops, such as tea, leguminous shade trees may provide the major part of the nitrogen needed. In order to establish a good cover of weeds a fairly high nitrogen level is required. It is shown that there is a close relationship between the nitrate gradient of the soil profile and the depth of rooting.

3969. ISHIDA, J., AND ELLIOTT, R.
Temperatures for shipping and storing fruits and vegetables.
Agric. Ext. Circ. Hawaii agric. Ext. Serv. **296**, 1951, pp. 2, bibl. 1.

Suitable temperatures and relative humidities are given for the storage of avocadoes, bananas, papayas, pineapples, cabbage, green corn, cucumbers, eggplant, lettuce, potatoes, sweet potatoes and frozen fruits and vegetables.

3970. BARNES, H. V., AND ALLEN, J. M.
A bibliography of plant pathology in the tropics and in Latin America.
Bibl. Bull. U.S. Dep. Agric. **14**, 1951, pp. 78. U.S. Govt. Printing Office, Washington D.C.

Consists of 2,395 well indexed and very briefly annotated citations covering sub-tropical regions in S. America only. It also cites 7 other important reference bibliographies.

Bananas.

(*See also* 3964, 4080n.)

3971. TIZIO, R. M.
Acción del ácido 2-4-diclorofenoxiacético sobre los procesos de maduración de bananas bajo diferentes períodos de exposición a luz. **(The effect of 2,4-D and different periods of exposure to light on the ripening process of bananas.)** [English summary ½ p.]
Rev. Fac. Agron. La Plata, 1950, **27**: 249-61, bibl. 14.

A study was made of the effects of 2,4-D, at concentrations of 0·5, 0·16 and 0·035%, on the colour and

appearance of harvested green bananas and on their acid and sugar contents and pH, when the fruit was kept either in continuous light, in a natural day length of 16 hours or in continuous darkness. The highest concentration of 2,4-D, in light, caused the disappearance of the green and yellow pigments and hastened the process of putrefaction. The lower concentrations resulted in normal coloration. In the treated fruit the amount of total sugars and the total acidity was greater and the pH lower in the "light" groups than in the "dark" groups, while in the untreated fruit the opposite was true.

3972. Jeater, J. G., Cann, H. J., and Eastwood, H. W.
Hormones used to destroy bananas.
Agric. Gaz. N.S.W., 1951, **62**: 77-81, 140-4, bibl. 2, illus.

Each year as banana plantations in New South Wales become uneconomical they are destroyed and replaced by new plantings. Recent experiments have shown that using MCPA or 2,4-D to destroy bananas can be cheap, easy and efficient. Banana stools can be destroyed completely with injections of hormones with a strength range of from 5 to 0·2% if such injections are followed by two regrowth sprays of 0·2% when regrowth reaches the height of approximately 12 inches. Injections made during wet weather are quite satisfactory, but spraying in such weather is unsatisfactory.

Cacao.

3973. Watrous, R. C.
Cacao, a bibliography on the plant and its culture and primary processing of the bean.
Library List U.S. Dep. Agric. **53**, 1950, pp. 49. U.S. Dept. Agric. Library, Washington D.C.

This bibliography includes 1,385 references to publications on cacao cultivation in different parts of the world in its general and special aspects as also on its botany and pathology and pests, and on the practical and scientific aspects of the primary processing of the bean. It does not deal with processing outside the country of origin or with historical aspects. It covers mainly literature held by the U.S. Department of Agriculture's library published in the period 1920-1949. The sources quoted, which include *Horticultural Abstracts*, the *Review of Applied Entomology Ser. A* and *Review of Applied Mycology*, would appear to be fairly comprehensive, but more sources are used than appear in the lists given, e.g. the *Annual Reports of the Imperial College of Tropical Agriculture on Cacao Research*.

3974. Morales, M. O.
Cultivo racional del cacao. **(Cultivation of cacao.)**
Agr. Rep. Dominica, 1950, **40**: 187: 5-8, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 462.

An account of the cultivation and preparation of cacao in the Dominican Republic, giving the fermentation time required for the different varieties.

3975. Ciferri, R.
Análisis de un trientenio de producción y costos de una hacienda en las Trincheras (estado Carabobo Venezuela). **(Analysis of the yields and cost of production of a [cocoa] estate in Las Trincheras, state of Carabobo, Venezuela, over a period of 30 years.)**
Rev. Fac. nac. Agron. Colombia, 1950, **11**: 19-33, bibl. 1.

Data relating to annual yields, costs of production and returns are tabulated and discussed for a 21 ha. cocoa estate in Venezuela, at an altitude of 360 m. and with an annual rainfall of 1,000-1,200 mm. The estate was irrigated and shaded, and the types of cocoa grown were Cundeamor, Angoleta and Amelonado. Half way through the 30-year period recorded, the trees became infected by a species of *Monalonium*. The average yield after infection was 35·05% that of the average yield before infection.

3976. Richards, A. V.
The propagation of cacao from cuttings.
Trop. Agriculturist, 1950, **106**: 104-7, bibl. 8, illus.

In preliminary trials with 3-leaf, soft wood, fan cuttings with the leaves cut in half, 93% rooting was obtained in sand or coir dust when the cuttings were set in cloth-covered beds and the humidity maintained at 98% or more. An overhead pipe from which water dripped continuously on to a row of porous bricks running down the centre of the bed was a cheap and effective way of maintaining humidity. Only 29% of cuttings set in soil rooted.

3977. van Emden, J. H.
Over het kweken van oculatiehout bij cacao. **(Raising cacao budwood.)** [English summary 14 lines.]
Bergcultures, 1950, **19**: 405-6.

Growers are advised not to cut back young buddings of cacao in order to obtain supplies of budwood, as this practice results in a high death rate among the buddings, makes them more susceptible to termite attack and encourages horizontal branching. The stems should rather be bent and suckers allowed to develop. Data are tabulated on the effects of the two methods.

3978. Soetardi, R. G.
De betekenis van insecten bij de bestuiving van *Theobroma cacao* L. **(The importance of insects in the pollination of *Theobroma cacao* L.)** [English summary 2 pp.]
Arch. Koffiecult., 1950, **17**: 1-31, bibl. 20, illus.

In experiments carried out in a cacao plantation of the C.P.V. Experiment Station, Bogor, the following results were obtained. Pollination did not occur in flowers enclosed in insect-free cages where the action of wind was simulated, and there was little cacao pollen present in the air of the plantation. It appears unlikely, therefore, that the flowers are wind-pollinated. Thirty-one different insects were found on cacao flowers, 5 of them commonly. Night-flying insects played no part in pollination. Of the 5 insects commonly found, only the female of *Forcipomyia* could effect pollination,

and flowers enclosed in cages with this insect were better pollinated than those in natural conditions. *Forcipomyia* seldom appears after long droughts or on rainy days. It is active between 7.30 and 10.30 a.m., and is easily carried by the wind. Its method of entering the flower would account for the high percentage of cross-pollination that occurs in nature.

3979. EBES, K., AND VINK, A. P. A.
Bodem en bemesting in de cacao-cultuur. **(Soils and manuring in cacao culture.)**
Arch. Koffiecult., 1950, **17**: 53-99, bibl. 22, illus.

The prospects of extending the cultivation of cacao in Indonesia are discussed in this paper, which gives an account of the cacao soils of central Java, of manurial experiments that have been carried out in various parts of the world, and of the work that is being done in west Java and central Sumatra. An appendix entitled "The most important literature on the soils and manuring of cacao up to 1950" contains 108 references.

3980. GREENWOOD, M., AND HAYFRON, R. J.
Iron and zinc deficiencies in cacao in the Gold Coast.
Emp. J. exp. Agric., 1951, **19**: 73-86, bibl. 12, illus.

Lime-induced deficiencies are uncommon in the Gold Coast owing to the rarity of calcareous soils. Deficiency symptoms have, however, occurred near termite mounds, or near accumulations of wood-ash resulting from forest felling and burning. They have also occurred in potting soils when decomposing surface litter, rotted cacao husk or cacao-bean ash have been added. Iron deficiency is characterized in young seedlings by chlorosis which becomes more pronounced with each succeeding leaf flush. The last leaves are ivory-white. Tip-scorch and leaf-curl are common. In year-old seedlings chlorosis does not increase regularly. Spraying with 1% ferrous sulphate solution improved the leaf colour rapidly. Soil treatment with sulphuric acid and ferrous sulphate also reduced chlorosis. Sickle-leaf is the most notable characteristic of zinc deficiency, though the leaves may be straight but attenuated. Bluish-green vein banding and chlorotic patches of primrose colour also occur. Zinc deficiency was diagnosed in a series of water culture experiments. The deficiency symptoms are associated with high pH and high available phosphate and potash. Pot experiments suggested that potassium salts can only induce sickle-leaf with a pH above 7·5. Young leaves have responded to infection or painting with zinc-sulphate-sulphuric acid solutions. Mature leaves have not responded. Symptoms described by Ciferri in the Dominican Republic appear to be the same as those caused by zinc deficiency in the Gold Coast.

C.W.S.H.

3981. STRICKLAND, A. H.
The entomology of swollen shoot of cacao. I. The insect species involved, with notes on their biology.
Bull. ent. Res., 1951, **41**: 725-48, bibl. 16.

The entomological problem of swollen shoot of cacao involves the inter-relations in the field of over 120 insect species of 4 insect and 2 arachnoid orders. There are 17 species of pseudo coccids, 75 species of ants, 16 species of hymenopterous parasites, 3 predatory beetles, 1 predatory dipteran, and 3 arachnid species involved in vector relationships directly, and 18 coccid species involved indirectly. The coccid species are named and a series of preliminary observations on their biology and field behaviour detailed. The ant species have been sorted into groups and information given on their field habits and relative abundance. There are three distinct but complementary ecological niches involved in the problem and these are described.—W. African Cacao Res. Inst., Tafo, Gold Coast.

3982. TODD, J. M.
An indigenous source of swollen shoot disease of cacao.
Nature, 1951, **167**: 952-3, bibl. 1.

Investigations have shown that the small tree, *Cola chlamydantha*, is the immediate natural reservoir of cacao viruses in the Western Province. Its control is a matter of prime urgency.—West African Cacao Res. Inst., Tafo.

3983. KEVORKIAN, A. G.
The cushion-gall disease of cacao.
Abstr. in *Phytopathology*, 1951, **41**: 562-3.

A previously undescribed disease of cacao attacks the floral cushions in trees in Nicaragua, Costa Rica, and Panama. The floral cushion is stimulated to produce large numbers of floral initials or buds, and then it resembles a hemispherical gall 1-3 in. in diameter. The causal agent has not been investigated, but the systemic nature of the disease suggests a virus.

3984. PLATONE, E., AND CIFERRI, R.
Algunas observaciones sobre el desecamiento del grano de cacao bajo diferentes conditiones. **(Observations on the drying of cocoa under different conditions.)**
Rev. Fac. nac. Agron. Colombia, 1949, **10**: 296-300, bibl. 1 [received 1951].

In trials conducted at the Ocumare de la Costa Cacao Centre, Aragua, Venezuela, the effect of drying cocoa under various conditions of sun, shade and artificial heat was studied. Drying in the shade was always found preferable to drying entirely in the sun, although equally good results were obtained by drying partly in the shade and partly in the sun. The appearance of cocoa dried in artificial heat, even at the most favourable temperature of 45° C., was inferior to that of cocoa dried in the shade. It is suggested that the effect of light during drying should be studied.

3985. ANON.
Vom kakaoschalen-problem. **(The problem of cacao husks.)**
Gordian, 1950, **50**: 1197: 24, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 709.

The utilization of cacao husks is discussed. Their greatest value is as a source of theobromine. The fat content of the husks is only 2–6%.

3986. SCHMECHEL, D. S. O., AND LÜCHOW, G.
Zum Kakaoschalenproblem. **(The problem of cacao husks.)**
Gordian, 1950, **50**: 1187: 62-5, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 382.

The utilization of cacao by-products, in particular the husks, is discussed.

Cinchona.

3987. Anon.
Cinchona cultivation and sales, Philippines.
Foreign Commerce Wkly, Wash., 1950, **38**: 8: 30, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 244.
Information is given on varieties and bast analysis of cinchona in the Philippines.

3988. Chandler, C.
Flowering habits and fertility of some *Cinchona* species in Guatemala.
Contr. Boyce Thompson Inst., 1951, **16**: 249-59, bibl. 7.
A detailed study was made of the flowering habits and fertility of clones of *Cinchona ledgeriana, C. calisaya* and *C. succirubra*. Interspecific hybrids were also studied. Clones were either long-styled or short-styled. *C. ledgeriana* and long-styled flowers of *C. calisaya* opened at night. Short-styled *C. calisaya* flowers belonged to either day-opening or night-opening types. A majority of *C. succirubra* buds never opened and the opening of the remainder was irregular. *Cinchona* flowers may be wind- or insect-pollinated. Both types of clone of all three species were self-sterile. Short-styled × short-styled and long-styled × long-styled crosses also failed to set seed. Long-styled × short-styled crosses were, however, fertile. Seeds and seedlings treated with colchicine showed polyploid characteristics. Some *C. succirubra* seeds produced green and white variegated seedlings.
C.W.S.H.

3989. Moreau, C., and Moreau, M.
Note préliminaire sur quelques maladies des quinquinas à Madagascar. **(A preliminary note on some *Cinchona* diseases in Madagascar.)**
Mém. Inst. sci. Madagascar, Ser. B, 1949, **2**: 159-60 (published 1950), from abstr. in *Rev. appl. Mycol.*, 1951, **33**: 289.
Three serious diseases were present on *Cinchona succirubra* from Madagascar, the fungi found being: (1) abundant white mycelium of a basidiomycete, found beneath the bark, (2) *Fusarium javanicum* from the roots and collar bark, (3) *Lasiodiplodia theobromae* causing a rot of the declining upper branches of some trees, the pith of which was invaded by a brown mycelium. Of these diseases the first mentioned is the most serious, and the burning of affected parts is recommended. Good cultural practice and constant surveillance are needed to avoid contamination.

3990. van Zwet, A. J.
Een praktijkmethode ter bestrijding van rupsenplagen in kinatuinen. **(A practical method of controlling caterpillars in cinchona plantations.)**
Bergcultures, 1950, **19**: 331.
When the hot weather begins, caterpillars, especially *Cricula trifenestrata*, descend from cinchona trees during the daytime to take shelter in the weed cover. It has been found that if plantations are clean cultivated at the first sign of infestation during the dry season the pest can be satisfactorily controlled.

Coconuts.

3991. Liyanage, D. V.
The relative merits of first and second bunch coconuts for seed purposes.
Trop. Agriculturist, 1950, **106**: 151-5, bibl. 3.
The common practice on estates is to harvest coconuts once every 2 months, 2 bunches being usually picked at each harvest, the one being about 1 month older than the other. Comparisons in the nursery between first bunch (older) and second bunch nuts showed no significant differences in percentage germination, time taken to germinate or in average numbers of leaves or roots per seedling. Similarly no differences were found in adult palms from the 2 seed sources in the period taken for flowering or in their yields.

3992. Reyne, A.
Studies on a serious outbreak of *Aspidiotus destructor rigidus* in the coconut-palms of Sangi (North Celebes).
Tijdschr. Ent., 1946, **89**: 83-123, bibl. 44, illus., from abstr. in *Rev. appl. Ent.*, 1951, **39**: 135.
Detailed accounts are given of the course of the outbreak, the damage caused, the studies that established the identity of the coccid concerned, the characters that differentiate it from the typical *A. destructor* Sign., its life-history, distribution, and natural enemies. Predators and parasites mentioned are of little importance for controlling the coccid.

Coffee.

(*See also* 3965, 3966, 4080d, g, k.)

3993. Mirrado, J. H. M.
Algumas notas sobre a importância económica e social da cultura do café em Cazengo. **(Notes on the economic and social importance of coffee growing in Cazengo.)** [English and French summaries ½ p. each.]
Agron. angol., 1950, No. 4, pp. 65-104.
Labour, capital and financial aspects of coffee growing in the Cazengo area of Angola are discussed in the light of their social implications.

3994. Sousa de Macedo, J. C.
O custo da produção do café nas propriedades dos tipos medio e ideal, no Libolo e nos Dembos, no ano de 1947. **(The cost of coffee production on farms of medium size and ideal size in Libolo and Dembos [Angola] in 1947.)** [English and French summaries ¼ p. each.]
Agron. angol., 1950, No. 4, pp. 15-64.
Capital and cost accounts are analysed for 2 farms of average size and 2 farms of what is considered the ideal size economically, in different areas of Angola, representing different soil types and methods of production.

3995. Horn, E. F.
Possibilidades do cultivo do café no estado do Pará. **(The possibilities of coffee growing in the state of Pará [Brazil].)**
Bol. Super. Serv. Café, S. Paulo, 1951, **26**: 213-22.
A study of the climate, soils, geographical features,

vegetation and labour available in the lower valley of the Tocantins river, Pará, leads to the conclusion that this region has better potentialities for coffee growing than the famous central-southern district of Brazil. The soil is naturally fertile, there is no risk of frost, hail or drying winds, river transport would be available and the price of land is low. If quarantine measures were taken, it should be possible to prevent the introduction of the coffee berry borer. The principal disadvantage is that coffee tends to ripen unevenly in this district, but this could probably be overcome by growing the trees without shade. Arabica coffee grown at low altitudes near the equator tends to be "light in cup", but it is considered that Robusta coffee could be grown there very satisfactorily. The cost of establishing a new plantation and the subsequent cost of production are estimated.

3996. González O., C., Arroyo B., C., and Solís R., F.
Informe sobre el cultivo del café en Santa Ana (El Salvador). **(Report on coffee growing in Santa Ana, El Salvador.)**
Suelo Tico, 1950, **4**: 343-54, illus.

The factors which contribute to the high yields of coffee obtained in El Salvador, compared with those in Costa Rica, are discussed. The climate does not favour the development of *Omphalia flavida* and other leaf diseases. The soils are deep, fertile and permeable, and there is little erosion. 90% of the coffee grown in Santa Ana is of the Bourbon variety or a Bourbon hybrid. The trees are left unpruned to a height of 1·75–2 m. and are then bent over to encourage multiple stem formation.

3997. Castillo, C. M.
Producción de café. **(Coffee production [in Costa Rica].)**
Suelo Tico, 1950, **4**: 284-7.

Statistical tables are given showing the amount of coffee milled annually in the various districts of Costa Rica during the period 1945-49, and the amount produced in the 1934-35 and 1948-49 seasons.

3998. Tosello, A.
Notas sôbre as possibilidades de mecanização da cultura cafeeira. **(Notes on the possibility of mechanizing coffee growing.)**
Bol. Super. Serv. Café, S. Paulo, 1950, **25**: 868-73, illus.

The possibility of mechanizing the various cultural operations involved in coffee growing is being investigated at the Instituto Agronômico, Campinas, and some of the conclusions reached are discussed here. Mechanical harvesting is considered impracticable owing to the heterogeneity of tree form, the uneven distribution of fruit on the trees and its uneven ripening. Mechanization of other operations would be facilitated by planting on the contour with wider distances between the rows. The dangers of erosion and damage to the shallow root system have to be considered when mechanizing surface cultivation, but these dangers are minimized by the use of rotary hoes. Promising machines have recently been developed for fertilizer distribution and several other operations.

3999. Carvalho, A.
As variedades do café e o seu melhoramento. **(Coffee varieties and their improvement.)**
Bol. Super. Serv. Café, S. Paulo, 1950, **25**: 687-93, 780-6, bibl. 8.

The principal coffee varieties grown in the state of São Paulo, Brazil, are Nacional, Amarelo de Botucatu, Bournon, Bourbon amarelo, Maragogipe, Sumatra and Caturra. Brief notes are given on their origin, characters and performance. The last five mentioned are the most productive, and selections from these are being made at the Instituto Agronômico. Seed of selections from Bourbon vermelho, Caturra, Maragogipe AD and Sumatra comun has already been distributed to growers for large-scale propagation, but selections of Bourbon amarelo and Sumatra Mundo Novo are not yet ready for distribution.

4000. Leupen, F. F.
Conuga-koffie. **(Conuga coffee.)**
Bergcultures, 1950, **19**: 377-83, bibl. 9.

Observations on the characteristics and performance of the coffee variety Conuga are summarized, as a basis for further selection and testing. The variety is a hybrid between *Coffea congensis* and *C. ugandae*. Owing to its regular cylindrical shape, it can be planted close, 1,600 trees per ha. It has a long flowering period, is reasonably self-fertile, and is well adapted to either very wet or very dry conditions. Its low light requirement makes it a good intercrop for hevea. As the variety is not genetically stable it is propagated commercially by cuttings or grafting. The relative values of the various clones are discussed, and the work that has been done in selection is reviewed.

4001. Arroyo B., C.
Siembra vegetativa de café, tratamiento con Hortomone "A". **(Vegetative propagation of coffee, using Hortomone A.)**
Suelo Tico, 1950, **4**: 335-8, illus.

On a coffee estate at Diriamba, Nicaragua, 90% rooting of coffee cuttings was obtained in large-scale trials when 24–27 in. cuttings were treated with Hortomone A, at 1: 160, for 16-18 hours. The best results were obtained in the spring, when the cuttings absorbed the hormone solution rapidly.

4002. de Camargo, R.
O cafeeiro quer mais fósforo ou mais potássio ? **(Does coffee need phosphorus or potash most ?)**
Bol. Super. Serv. Café, S. Paulo, 1950, **25**: 596-603, 681-6.

From a review of the literature it is shown that the coffee tree extracts 4 or 5 times more potash than phosphate from the soil, that the terra rossa coffee soils of Brazil are richer in phosphate than in potash, and that potash is leached from the soil much more rapidly. It is therefore concluded that the heavy dressings of phosphate usually applied to coffee in Brazil are unnecessary, and that more potash should be given together with applications of organic matter to prevent leaching.

4003. Mendes, C. T.
Adubações fosfatadas. **(Phosphate manuring.)** [English summary ½ p.]
Rev. Agric. Piracicaba, 1950, **25**: 1-22.

Five experiments on the phosphate manuring of coffee and cotton on the terra rossa soil of Brazil are reported. Finely ground Apatita do Ipanema, a crystalline phosphorus ore, appeared to be completely unavailable to coffee trees. One heavy application of calcium superphosphate or Renania phosphate, however, resulted in considerably increased yields over a period of 11 years. Bone meal was also very beneficial after the first year of application.

4004. Coelho de Souza, W. W.
Culturas permanentes: defesa do solo—papel da matéria orgânica. **(Permanent crops: soil conservation and the importance of organic matter.)**
Bol. Super. Serv. Café, S. Paulo, 1950, **25**: 874-84, illus.

Recommendations are made concerning the restoration of old coffee plantations [see abstr. 4006] and the establishment of orchards on eroded soils. The planting of mixed orchards (mangoes, oranges, avocadoes, cashews, etc.) is advocated. These should be planted on the contour, and the soil should be well limed and sown with annual legumes. Permanent legumes, such as tropical kudzu or "guandu" should also be planted to provide shade and enrich the soil.

4005. Suarez de Castro, F.
Experimentos sobre la erosión de los suelos. **(Experiments on soil erosion.)**
Bol. tech. Fed. nac. Cafeteros, Colombia, **6**, 1951, pp. 44+48 tables of data, bibl. 12, illus.

This is a summary of results obtained in 1949 and 1950 in investigations on soil and water conservation in relation to coffee growing in Colombia. Data were obtained from 18 plots varying in size from 1/500 to 1/88·33 ha., on steep slopes. The plots were separated by metal partitions and the rainwater and soil passing through the plots after each fall of rain was collected in sedimentation tanks and the amount of soil estimated.

4006. Coelho de Souza, W. W.
Sombreamento dos cafèzais. **(Shading coffee plantations.)**
Bol. Super. Serv. Café, S. Paulo, 1950, **25**: 606-17.

Recommendations made by the Ministry of Agriculture, Brazil, in its programme for the restoration of permanent crops are discussed in so far as they concern the restoration of old coffee plantations and the establishment of new ones. Liming, organic manuring, green manuring, contour planting and shading are the essentials for success. *Inga* spp. are recommended as permanent shade trees, and *Cassia strobiliacea* for temporary shade in the early years.

4007. Mendes, C. T.
O sombreamento dos cafezais. **(Shading coffee plantations.)**
Rev. Agric. Piracicaba, 1950, **25**: 213-23.

A series of 7 experiments is reported on the effect of shade on the drinking quality of coffee. Although contradictory results were obtained, it is concluded that in general shading does improve quality.

4008. González, C. A.
Quien poda sus cafetos poda sus ganancias. **(Who prunes his coffee prunes his profits.)**
Suelo Tico, 1950, **4**: 355-8.

Experiments carried out in Puerto Rico, Brazil, Guatemala, Colombia and Costa Rica have shown or are showing that the harder coffee trees are pruned, the lower is the yield. From the results of these experiments it is recommended that the trees be left unpruned, except for the removal of broken branches, until they reach a height of 1·75–2 m. They should then be bent over to induce the formation of a multiple stem.

4009. Pazzanese, F.
Observações em torno do combate á geada nos Estados Unidos da América do norte e sua adaptação aos nossos cafézais. **(Observations on methods of frost protection used in the United States and their application in the coffee plantations of Brazil.)**
Bol. Super. Serv. Café, S. Paulo, 1950, **25**: 961-76, illus.

This report on the work that is being done in the United States on frost protection of fruit trees concludes with the recommendation that fans and certain types of orchard heater should be tested in the coffee plantations of São Paulo and Paraná.

4010. Heim, R., and Saccas, A.
La trachéomycose des *Coffea excelsa* et *robusta* des plantations de l'Oubangui-Chari. **(Tracheomycosis of *Coffea excelsa* and *robusta* in the plantations of Oubangui-Chari.)**
C.R. Acad. Sci., Paris, 1950, **231**: 536-8, from abstr. in *Rev. appl. Mycol.*, 1951, **30**: 228-9.

Information is given on the tracheomycosis of coffee caused by *Fusarium xylarioides* in the Belgian Congo. *Coffea neo-arnoldiana* is as susceptible as the cultivated varieties. Wild varieties of *C. excelsa* are reputedly resistant. The susceptibility of *C. robusta* was confirmed by inoculation experiments. *C. excelsa* may be attacked at any time from the cotyledonary stage to an advanced age, but the percentage of mortality is highest in bushes entering upon production. The high degree of susceptibility of the cultivated varieties of *C. excelsa* is attributed, *inter alia*, to physiological lack of balance, pruning and cultural methods, but a more plausible explanation would seem to be afforded by the existence within the species of races or individuals with very different degrees of susceptibility to *F. xylarioides*.

4011. Jacques-Félix, H.
Première action contre la trachéomycose du caféier en Côte d'Ivoire. **(Preliminary action against tracheomycosis of coffee trees in the Ivory Coast.)**
(*Publ.*) *Stat. tech. Agric. trop. Nogent-sur-Marne*, 1950, pp. 12, illus., from abstr. in *Rev. appl. Mycol.*, 1951, **30**: 269-70.

Affected trees appear quite normal until a few weeks before maturity, when the leaves are shed, the berries wither and the trees die. The vessels were found to be obstructed by the mycelium of a *Fusarium* sp. Of the Kouilou, Indénié, and Robusta lines, Kouilou is the

most susceptible and Robusta, in the Ivory Coast at least, practically resistant. Infected trees should be felled and burnt before the spores are released. If left too late they should be destroyed by spraying an inflammable liquid on to the trunk.

Mangoes.

4012. GANGOLLY, S. R., AND SINGH, D.
Distribution of the mango (*Mangifera indica* L.) and its varieties.
Indian J. Hort., 1950, **7**: 3/4: 7-16, bibl. 5, map.

The history of the distribution of the mango in different parts of the tropics is outlined. It is grown in almost all parts of India up to 3,500 ft., and the principal varieties found in each of the 5 regions defined by the Indian Council of Agricultural Research are indicated, together with notes on the soil and climatic conditions in each region.

4013. MALLIK, P. C.
Inducing flowering in mango by ringing the bark.
Indian J. Hort., 1951, **8**: 1: 1-10, bibl. 5.

Experiments were carried out over several years at the Fruit Research Station, Sabour, to determine whether ringing would induce flowering in the following year in both young and mature trees of the varieties Bombai, Langra and Fazli, the first two of which are particularly subject to biennial bearing. Ringing individual branches in early August increased subsequent flowering in both " off " and " on " years, but ringing the whole trunk, even with two half rings, had an adverse effect on the health of the trees. Ringing in mid-August and early September was less successful. Rings $\frac{1}{2}$ in. wide were generally more satisfactory than rings $\frac{3}{4}$ in. wide which were apt to take too long to heal, or than rings $\frac{1}{4}$ in. wide which tended to heal too quickly. The ringed trees benefited from an application of F.Y.M. and sulphate of ammonia immediately after ringing. Ringing branches in successive years was also successful.

4014. RICHARDS, A. V.
Top-working of mango in the dry zone.
Trop. Agriculturist, 1950, **106**: 148-50, bibl. 2, illus.

About 200 8-year-old Sabre trees growing on local sour mango stock at Hingurakgoda, Ceylon, were successfully top-worked to the variety Karuthacolomban without initial deheading. In selected parts of branches a triangular piece of bark was removed and running downwards from it two cuts were made to provide a flap under which a side graft could be inserted. The scions, consisting of 8-9 in. long terminal shoots, were defoliated about 10 days before being used. In grafting, their lower ends were cut to a wedge and they were inserted behind the flap on the stock stem. The flaps were kept firmly pressed against the scions by strands of coir string and the union covered with a mixture of cow dung and soil. A horizontal notch was cut about 6 in. above the triangular patch to encourage the graft to grow. The trees were deheaded after the new scions had produced a new flush of growth.

Oil palms.

(*See also* 3965, 4080 l.)

4015. BUDOWSKI, P.
La palma oleaginosa africana (*Elaeis guineensis*). **(The African oil palm (*Elaeis guineensis*) [in Venezuela].)**
Agric. venezol., 1950, **15**: 148: 8-9, illus.

The oil palm has recently been introduced into Venezuela by the Compañía Anónima Bananera Venezolana, who have planted up about 1,000 ha. in the state of Yaracuy. The trees are growing vigorously and 1,800 tons of oil are being produced a year. Two serious problems, however, have been encountered: (1) the appearance of a disease of unknown origin which attacks the trees at the beginning of the fruiting season, and (2) the lack of a market for the oil, owing to competition from imported, cheaply produced coconut oil.

4016. ABREU VELHO, H. L.
Características dos óleos de palma de variedades definidas. **(Characteristics of the oil from different varieties of oil palm.)** [English and French summaries $\frac{1}{3}$ p. each.]
Agron. angol., 1950, No. 4, pp. 131-9, bibl. 23.

No characteristic varietal differences were observed in the chemical constants of the oil from the various types and varieties of *Elaeis guineensis*, i.e. varieties dura, pisifera and tenera, type nigrescens, and varieties dura and tenera, type virescens.

Other palms

4017. HODGE, W. H.
Palms—princes of the plant world.
Nat. Hist., 1950, **58**: 392-8, 429-30, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 762.

The distribution, growth habit and uses of the different species of palm are dealt with.

4018. DE WILJES, H. G.
The sagopalm.
Econ. Rev. Indonesia, 1950, **4**: 98-9, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 768.

The economic importance of the sagopalm in Indonesia and the various methods of sago preparation are discussed.

Papaw.

(*See also* 3964, 4080m.)

4019. KUMAR, V.
Studies in *Carica papaya* Linn. 1. Preliminary observations on the relation of sex to the pre-flowering growth of papaya seedlings and external characters of seeds.
Indian J. Hort., 1951, **8**: 1: 26-34, bibl. 17.

From preliminary studies at the Horticultural Research Station, Saharanpur, U.P., it would appear that papaw seeds with a deeper brown colour produce a higher proportion of ♀ plants than do lighter coloured seeds. It is not clear whether this is due to a relationship

between seed colour and sex or between age of seed at the time of picking, as indicated by colour, and sex. Measurements of seedlings suggest that at 12 weeks old ♂ seedlings show a higher rate of stem elongation than do ♀ or ♂ seedlings. Further work is necessary, however, before definite conclusions can be drawn.

4020. ADSUAR, J.
Studies on virus diseases of papaya (*Carica papaya*) in Puerto Rico. IV. Preliminary studies on the host range of papaya mosaic.*
Tech. Pap. agric. Exp. Stat. Rio Piedras Univ. Puerto Rico **5**, 1950, pp. 5, bibl. 2.
Forty-nine species of plants representing 21 families were tested. Of these only pepinito, *Melothria guadalupensis*, was found susceptible to the papaya mosaic virus; it proved to be a symptomless carrier.

4021. CHOWDHURY, S.
A fruit rot of papaya (*Carica papaya* L.) caused by *Ascochyta caricae* Pat.
Trans. Brit. mycol. Soc., 1950, **33**: 317-22, bibl. 12, illus.
This disease has been observed in the papaya-growing regions of Assam. The fungus and the symptoms of the disease are described. It can be controlled by spraying the fruits with 2: 2: 50 bordeaux mixture at intervals of 21-30 days.

Pineapple.

(*See also* 3964, 4080b.)

4022. COLLINS, J. L.
Notes on the origin, history, and genetic nature of the Cayenne pineapple.
Pacific Sci., 1951, **5**: 3-17, bibl. 9, illus., being *Misc. Pap. Pineapple Res. Inst. Hawaii* **48.**
Evidence is presented to show that the Cayenne variety of pineapple was introduced to France from French Guiana in 1820. The first mention of it appears to be in an article in the *Gardeners' Chronicle* (England) of 6 March, 1841, in which reference is made to both smooth- and spiny-leaved forms. Its subsequent spread throughout the tropics is described. The genotype is highly heterozygous and it exhibits hybrid vigour in its growth. The variety is self-incompatible and must be propagated vegetatively. During its long period of vegetative propagation, a number of somatic mutations have appeared, including one giving the mutant type self-compatibility. The present Cayenne is a miscellaneous collection of clones. The diploid chromosome number is 50, with 100-chromosome tetraploids obtained by treatment of diploids with colchicine. The tetraploids are inferior to the diploids.

Rubber.

(*See also* 3518, 3965.)

4023. URIBE HENAO, A.
Aspectos técnicos en la producción de caucho hevea. **(Technical aspects of the production of hevea rubber.)**
Rev. Fac. nac. Agron. Colombia, 1950, **11**: 151-244, bibl. 71, illus.
As well as other subjects which one might expect and which actually are dealt with in this informative review, the following are also considered: The genus *Hevea*; Industrial classification; Do there exist types of hevea superior to those now cultivated ? Exploitation of wild trees; and Synthetic products.

4024. MCCOLM, E. M.
Postwar agricultural production and processing of natural rubber.
India Rubb. World, 1950, **122**: 171-7, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 409.
Methods of rejuvenation, replanting, tapping and preparation are reviewed.

4025. ANON.
Plantations indigènes de caoutchouc au Congo belge. **(Indigenous rubber plantations in the Belgian Congo.)** [With Dutch text and English summary.]
Congopresse, 1950, **65**: 1259, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 410.
Notes on the native production of rubber in the Belgian Congo. As much of the indigenous forest is retained in the rubber areas, less damage is caused by *Phomes* than in the European plantations.

4026. SCHWEIZER, J.
Aanbevolen heveaplantmateriaal 1950/51. **(Recommended hevea planting material, 1950/51.)**
Bergcultures, 1950, **19**: 417-21.
Amendments and additions are made to the 1949/50 recommendations of the C.P.V. Experiment Station [see *H.A.*, 21: 3039].

4027. VOLLEMA, J. S.
Plantverband, plantdichtheid en uitdunning in rubbertuinen. **(Planting systems, plant density and thinning in rubber plantations.)**
Bergcultures, 1950, **19**: 454-67, bibl. 12.
The author discusses the effects of the planting system, density and thinning of seedling and monoclonal rubber plantations on the following aspects of production: (1) the form, growth and production of individual trees, (2) the production per ha., (3) the thickness and regeneration of the bast, and (4) the incidence of disease and wind damage.

4028. SCHWEIZER, J.
Rubberpaggerverband in gemengde aanplantingen. **(Hedge planting of rubber in mixed plantations.)** [English and Javanese summaries ¾ p. each.]
Arch. Rubbercult., 1950, **27**: 277-300, bibl. 7, illus.
Various trials carried out in Java have shown that the system of planting rubber as hedges between areas of coffee or other crops has given better results than the traditional system of mixed planting. Planting distance in the row seemed to have little effect on the development of the individual tree. Test tapping for the purpose of selective thinning may be continued for longer in the hedge rows than in the square plant. When fully developed, the hedge must be considered as a unit. This unit has a maximum assimilating and absorbing area. Hedge planting can be especially

* Previous papers of this series are noted in *H.A.*, 21: 1187b.

useful on smallholdings, where it allows maximum rubber production combined with the cultivation of other crops.

4029. DE HAAN-HOMANS, L. N. S., AND VAN GILS, G. E.
The complex system of fresh hevea latex.
Arch. Rubbercult., 1950, **27**: 229-42, bibl. 19, illus., being *Commun. Found. indon. Inst. Rubb. Res. Bogor* **80.**

A continuation of the work done at the Foundation Indonesian Institute for Rubber Research, Bogor, on the yellow fraction of hevea latex [see *H.A.*, 18: 1504] has disclosed new facts which have modified some of the views previously expressed. The work is now summarized as follows: "The investigations have shown that fresh Hevea latex is a complex system containing as dispersed 'phases' in the serum: (1) Rubber particles to a D.R.C. of 40–50%. (2) Lutoids, i.e. viscous colloidal spheres, much bigger than the rubber particles and mostly sticking together to form big irregularly shaped bodies. The water content of the lutoids is so high that the D.R.C. of the total latex is only 30–40%. (3) Frey-Wyssling globules. The lutoids dissolve for the greater part in ammonia or other alkalis, they 'coagulate' when the latex is diluted with water but retain their form if the latex is diluted with salt solutions of certain concentration. By centrifuging the lutoids are collected in the bottom part of the tubes as a more or less yellow mass comprising a volume of 20–30% of the total volume of the latex. The Frey-Wyssling particles are separated as a thin yellow layer on top of this mass, comprising not more than 1% of the total volume. The fractions were named the white and the yellow fraction of latex and they were examined separately. Their properties are described and the importance of the lutoids to the general properties of the latex are discussed. The importance of the lutoids is much greater than might be expected from their quantity, the following factors being greatly influenced: mechanical and colloidal stability, stability against spontaneous coagulation, viscosity and creaming capacity. The variability of the latex is, moreover, partly due to the lutoids."

4030. RUINEN, J., AND DE HAAN-HOMANS, L. N. S.
Investigations concerning the origin of the lutoids of the latex of *Hevea brasiliensis*.
Arch. Rubbercult., 1950, **27**: 243-53, bibl. 6, illus., being *Commun. Found. indon. Inst. Rubb. Res. Bogor* **81.**

A study was made of the influence of the sieve tubes cut in tapping on the composition of hevea latex, and in particular on the amount of yellow fraction. It has been suggested that the lutoids originate partly or wholly from the sieve tubes [see *H.A.*, 20: 421]. An anatomical examination showed that not more than 10% of the functioning sieve tubes were cut in tapping, and no sieve tubes were found at the outer edge of the cut. The latices were collected separately from various depths, and all were found to contain 20–30% lutoids, even the thick white latex from the outer portion of the cut. It is therefore concluded that the lutoids do not enter the latex as a product of the sieve tubes, and the phloem sap is not responsible for variability in latex composition.

4031. RUINEN, J.
Het verloop van de melksapvaten in bladbasis en stengel van *Hevea brasiliensis*. **(The course of the latex vessels in the leaf base of *Hevea brasiliensis*.)** [English summary ½ p.]
Arch. Rubbercult., 1950, **27**: 267-76, bibl. 10, illus.

The findings of van Aggelen-Bot [see *H.A.*, 19: 606] are confirmed and elaborated. The system of latex vessels is shown to be of bicollateral origin, and to consist of one peripheral cylinder in the phloem composed of several anastomosing cylinders and one in the medulla. The connexion between the outer and inner cylinder occurs in the pulvinus and in the gap. The development of the system is described and an explanation is given of the interruption of the latex flow in the leaf base.—Treub Lab. Bogor.

4032. RUINEN, J.
Microscopy of the "lutoids" in hevea latex.
Ann. bogor., 1950, **1**: 27-48, bibl. 13, illus., also summarized version in *Arch. Rubbercult.*, 1950, **27**: 255-65, bibl. 4, illus.

A technique is described by which the lutoids in hevea latex may be detected histologically. The presence of lutoids has been demonstrated in the latex vessels of the bark, leaf stalks and young twigs.—Treub Lab., Bogor.

4033. R.R.I. MALAYA.
Treatment of wounds.
Circ. Rubb. Res. Inst. Malaya **32,** 1951, pp. 3.

Coagulum, where present, should be removed from all wounds. The wound dressings recommended are Vacuum product 2295-C and an asphalt-kerosene wound paint. With infected wounds discoloured tissue is first removed and the surface sprayed with any tar acid fungicide, a list of which is given in an appendix. Wounds caused by sodium arsenite or mouldy rot attack are treated with Vacuum product 2295-C, which is a grease. The wound dressings both encourage healing and give protection from insect and fungus attack. C.W.S.H.

4034. WIERSMA, J. H. N.
Meeldauwbestrijding bij rubber. **(Mildew control in rubber plantations.)**
Bergcultures, 1950, **19**: 431-5, illus.

Notes are given on the design and performance of some new power dusters for applying sulphur.

Sugar cane.

(*See also* 3523.)

4035. F.A.O.
Sugar.*
Commodity Rep. F.A.O., November 1950, pp. 29, 25 cents.

Details are given of world production and consumption by countries and of international trade and prices up to, and including, the 1949/50 crop. The rapid recovery

* An earlier review with the same title, issued in February 1950, was noted in *H.A.*, 20: 2043.

of sugar production is one of the outstanding developments in the world food picture. In 1949/50, world production, excluding the U.S.S.R., reached 30·4 million metric tons raw sugar compared with the pre-war average of 26·1 million tons and 29·6 million tons in 1948/49. The estimate for 1950/51 is 33·2 million tons. Changes from the pre-war pattern of production are discussed.

4036. Stern, W. R.
Varietal trials—1950 season.
Cane Grs' Quart. Bull., 1951, **14**: 127-40, illus.
Yields and cane sugar percentages are given for the plant cane and first ratoon crops of 11 variety trials in the northern, central and southern districts of Queensland. Plant cane yields are given for a further 7 trials. Q.50 gave the highest yield in 7 trials on a wide variety of soils. Other successful varieties were Pindar, 41MQ779, Trojan, Q.47, CP29/116 and Q.51. Also included in the article are the results of a trial of burning *versus* conserving trash, and of a trial of 8 velvet bean varieties for green manuring. In neither of these were spectacular results achieved. C.W.S.H.

4037. Mungomery, R. W.
The importance of foreign varieties and recent importations into Queensland.
Cane Grs' Quart. Bull., 1951, **14**: 155-8, illus.
A general account is given of the most important varieties which have been imported into Queensland from Java, Mauritius, the West Indies, U.S.A., South Africa, Hawaii, Fiji and Taiwan. The introduced canes are given fungicidal and insecticidal treatment and are grown in the quarantine houses of the Bureau of Sugar Cane Experiment Stations, which is the only body permitted to import cane. The subsequent testing of introduced varieties is described.
C.W.S.H.

4038. Locsin, C. L.
Sugarcane variety test.
Sugar News, 1950, **26**: 114-19, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 405.
In trials in the Philippines, which included several P.O.J. varieties, the highest yields were obtained from H.37-1933.

4039. Hughes, C. G.
Testing sugar-cane varieties for resistance to downy mildew disease.
Cane Grs' Quart. Bull., 1951, **14**: 163-6, illus.
As downy mildew disease came under control the testing centres were moved from the cane districts first to a forest-surrounded plot in the Bundaberg district and finally to the Pathology plot at Brisbane, far from any commercial plantings. Diseased planting material is planted at the end of the plot of a variety to be tested. When the cane is well established, maize seedlings are planted in the interspaces. The latter develop the disease rapidly and produce a large number of spores for the infection of the cane. Each variety is planted in three plots of 20 setts. Comparison is made with four standard varieties, one resistant (Co.290), two susceptible (P.O.J.2878 and Trojan) and one very susceptible (Eros). A table is given showing varieties arranged in groups according to their susceptibility.
C.W.S.H.

4040. King, N. J.
Q.28 and Q.50.
Cane Grs' Quart. Bull., 1951, **14**: 159-60.
The varieties Q.28 and Q.50 rapidly displaced the older varieties between 1943 and 1949. In the Mackay district yields per acre have risen steeply during that period. Q.50 was introduced later than Q.28 and it has proved to be the outstanding variety over a wide range of soils in all parts of Queensland. Only on rich river alluvium are Q.28 and Q.50 unsuitable, since on this soil they produce rank growth and lodge easily. Q.50 is susceptible to red-rot disease. C.W.S.H.

4041. Cheng, C. F., and Chen, M. C.
The morphology of Taiwan sugarcane varieties F 105 to F 134. [Chinese with English summary 3½ pp.]
Taiwan Sugar J. Quart., 1950, **2**: 3/4: 1-40, bibl. 15, illus.
The morphological characters of 31 Taiwan sugar cane varieties in the series F.105 to F.134 inclusive are described and a key, based largely on the Jesweit hair groups is provided [in English as well as Chinese] for their identification. F.108 still occupies more than 50% of the total planted area in Taiwan, but is susceptible to both mosaic and red root. F.110 and F.113 are also in commercial production. The best of the new canes is F.134 (P.O.J.2878 × Co.290) which in a two-year trial has proved superior in yield and sugar content to F.108.

4042. Mungomery, R. W.
Mosaic disease in south Queensland.
Cane Grs' Quart. Bull., 1951, **14**: 167-8, illus.
With the extensive planting of resistant varieties such as P.O.J.2878 and C.P.29/116, mosaic disease became of minor importance in South Queensland and many growers are now unfamiliar with the disease. With the increased planting of Q.50, Trojan and Pindar, odd stools of these varieties have become infected and in some cases diseased setts have been unwittingly planted. There is, therefore, danger of renewed spread of the disease by this means as well as through the agency of the corn aphis. C.W.S.H.

4043. Sun, V. G.
A review of the past experimental results in relation to the adaptability of POJ 2883, 2878, 2725, and F 108 in Taiwan. [Chinese with English summary 1 p.]
Taiwan Sugar J. Quart., 1950, **2**: 3/4: 41-70, bibl. 22.
The merits and defects of these four varieties are discussed in the light of experimental results published since 1927. There is no further justification for planting P.O.J.2725. P.O.J.2878 would still be of value if downy mildew could be controlled. P.O.J.2883 is still of value in southern Taiwan but should not be planted in the north. F.108 has given higher sugar

yields than P.O.J.2725 in the north of the island and than P.O.J.2883 in most parts of the south.

4044. Shee, B. W.
A preliminary report on the germination of sugarcane. 4. The effect of ammonium sulphate in germination. [Chinese with English summary 1½ pp.]
J. Sugarcane Res., Taiwan, 1950, **4**: 281-8, bibl. 3.

In a trial at Pintung Station, Taiwan, setts of the variety P.T.43-52 soaked for 24 hours in 0·1% $(NH_4)_2SO_4$ before being planted in trays containing sand, kept at 25% moisture and at 29–31° C., germinated more rapidly and grew significantly faster than cuttings that had been soaked in water or in stronger solutions of ammonium sulphate. Setts soaked in 5·0% ammonium sulphate failed to grow.

4045. Hao, C.
A preliminary report on the productibility [sic] of the first year ratoons of some sugarcane varieties in Taiwan. [Chinese with English summary 1¼ pp.]
Taiwan Sugar J. Quart., 1950, **2**: 3/4: 181-94, bibl. 7.

Two experiments are described in which growth records were taken on first ratoons of 11 early maturing varieties and 10 late maturing varieties. The early maturing varieties had originally been planted at 3 different times, in August, September and October, but this was not reflected in any differences in "germination" of the ratoons. Among the early varieties the highest percentage "germination" among ratoons was shown by F.134, followed by F.110 and F.119, all of which showed significantly higher "germination" than the standard variety F.108; the ratooning of F.122 was very poor. Among the late varieties ratoons of F.109 "germinated" best, followed by F.130, while F.121 and F.129 ratooned very poorly. There was no correlation between rate of "germination" and ultimate yield of ratoons; F.134 took the longest time to start re-growth but gave the highest yield of any variety. At 1½ months after "germination" the number of living stalks averaged about 4·5 per stool for the leading varieties in both groups. The stalks of ratoon canes generally showed a lower average length, diameter and weight than comparable stalks of plant canes.

4046. Loh, C. S., and Tseng, P. M.
A progressive report on the stalk growth of sugarcane in relation to its leaf blade area. A. The elongative growth of the internode and the leaf blade. [Chinese with English summary 3 pp.]
J. Sugarcane Res., Taiwan, 1950, **4**: 267-80, bibl. 1.

Under the climatic conditions of Pintung, Taiwan, internodes formed from June to September are 3 to 4 times longer than those formed from December to April. The factors affecting length of internodes were temperature and rainfall. As the temperature approached the optimum for growth, namely 27–28° C., the rainfall, and particularly its distribution during any period, exerted an increasingly marked effect. This emphasizes the importance of supplying adequate irrigation water during the period when the longest internodes are formed. Season had much less effect on the diameter of the internodes, and only during drought in March-April were diameters much reduced; internodes formed in the dry season from October to March were, however, on the average about one-fifth smaller in diameter than those formed in other months. The weight of internodes was much affected by climate, particularly rainfall; internodes formed in January-April averaged less than 15 g. compared with 50–60 g. for internodes formed in June-September. There was little relationship between the area of the leaf blade and the size of its corresponding internode. Size of leaf blades generally increased up to 8 months from planting, and thereafter remained fairly constant. The highest percentage Brix occurred in internodes formed in April to August, which is attributed to the combined effects of high temperature and abundant rainfall.

4047. Iyengar, C. V. K.
Intraseasonal growth variation and cultivation of sugarcane.
Nature, 1951, **168**: 252-3, bibl. 3.

The influence of the robustness of planting material on the progeny has been successfully used by the author in the cultivation of sugar cane and other crops. In experiments carried out with the variety Co.419 the length and number of successive internodes and the annual growth curve of the cane were recorded from December to July. Agreement between the two curves is good during the earlier period, but it is disturbed later. From a crop about a year old canes were harvested and setts were cut from the top and numbered. These setts, each with three eye-buds, were planted in October 1947 and harvested the following November. The tabulated results of this trial show that on the whole the first two setts are the best for early October planting. The next in order are the third and fourth, while the following setts, though often used by farmers, are of poor quality. This ranking is not valid for planting in other months.—Univ. of Mysore.

4048. Lee, S., and Lin, K. S.
Studies of the photoperiodic effect on sugar-cane. [Chinese with English summary 1½ pp.]
J. Sugarcane Res., Taiwan, 1950, **4**: 241-56, bibl. 5.

In a study at the Pintung Station, Taiwan, P.O.J.3016 and a local variety of *S. spontaneum* were subjected to day lengths of 6, 9, 12 and 15 hours and to natural day length as a control. The treatments had little effect on the number of internodes produced, but leaf blades became more erect and deeper green in colour the longer the plants were exposed to light. In general the growth rate, length of internodes and length and weight of millable cane increased proportionately with increased length of day up to 12 hours, but at 15 hours the growth rate and length of internodes declined. With P.O.J. 3016 the diameter of the internodes also increased proportionately with increased length of day but with *S. spontaneum* the reverse occurred. With *S. spontaneum* exposure to 9- and 15-hour days delayed flowering and at 15 hours the flowering period was also prolonged, though the pollen grains produced were plentiful and normal. With 6-hour days the plants did not flower.

4049. ANON.
Suikerrietcultuur met kunstlicht. (Sugar cane culture with artificial light.)
Beurs- en Nieuwsber. Ned. Antillen, 10 Oct. 1950, p. 3, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 679.
Experiments were carried out on the artificial illumination of sugar cane during the night to prevent flowering.

4050. LEE, L. S.
A lysimetrical study on five kinds of sugar-cane soil in Taiwan. [Chinese with English summary 1½ pp.]
Taiwan Sugar J. Quart., 1951, **3**: 2: 201-23, bibl. 8.
F.108 cuttings were planted in March 1948 in large pots containing 5 different soils, and were harvested the following March. Yields in an alluvial clay soil and a lateritic soil were much lower than in an alluvial loam, an alluvial sandy loam or a saline, sandy loam. In the clay soil roots did not penetrate below 30 cm. compared with more than 1 m. in the sandy soils. In sandy soils the canes flowered freely in November, but in the clay soil they had not flowered by March. Data are also presented on fertilizers applied and their retention, and on NPK analyses of stalks and leaves.

4051. LAI, T. M.
The problem of liming of Taiwan sugarcane soils. [Chinese with English summary 1½ p.]
Taiwan Sugar J. Quart., 1950, **2**: 3/4: 86-98, bibl. 33.
This paper is primarily a review of the literature on the liming of sugar cane soils. In Taiwan, where many of the cane soils are acid, two experiments, carried out in 1917 and 1943, showed increased cane yields from liming acid soils. Liming on neutral or alkaline soils gave negative results. More thorough investigations on the problem have now been started.

4052. BATES, G.
Trials with new legumes.
Cane Grs' Quart. Bull., 1951, **14**: 154.
Green manure crops are required for North Queensland which are resistant to wilt disease and will grow well under conditions of heavy rainfall. A test of imported Costa Rica legumes and Queensland cowpea selections showed that Reave's selection Q.1582 and Cristaudo pea are best suited to North Queensland conditions.
C.W.S.H.

4053. MOK, B. C., AND YEH, T. Y.
Report on the test of sugarcane varieties with heavy and light dosages of fertilizers. [Chinese with English summary 1 p.]
J. Sugarcane Res., Taiwan, 1950, **4**: 257-66, bibl. 7.
In an experiment with 4 varieties at Pintung, Taiwan, the standard fertilizer application of N: P_2O_5: K_2O =150: 8: 80 kg. per hectare gave significantly higher yields than applications of 50% and 150% of this amount. Increased fertilizer, however, resulted in more tillering. There was no interaction between yields of the 4 varieties of cane and soil fertility, but the two varieties that yielded best, Co.290 and F.134, appear to be better adapted to lower levels of fertility than the other two varieties, F.108 and P.O.J.2883.

4054. VALLANCE, L. G.
Soil fertility investigations. Results of the 1950 season.
Cane Grs' Quart. Bull., 1951, **14**: 141-7.
A table is given showing, for 6 districts, the percentage of soil samples giving high, fair and low contents of phosphate and potash. The figures suggest that potash deficiency is becoming more pronounced than that of phosphate. Reports are made on the progress of 7 NPK trials and on series of rock phosphate and minor element trials.
C.W.S.H.

4055. LAL, K. N., AND RAJAT DE.
Elemental composition of sugar-cane leaf and stem in relation to nitrogen deficiency.
Nature, 1951, **167**: 731-2, bibl. 4.
Plants of the sugar cane variety Co.453 were grown in (1) Hoagland's complete nutrient culture and (2) Hoagland's nitrogen-deficient culture for the entire life cycle. It was found that nitrogen deficiency lowered total nitrogen content of both stem and leaf, but other constituents in the leaf tended to increase in deficient cultures. P_2O_5 and Mg contents were increased more in the stem than in the leaf, while K_2O was higher in the leaf but did not change appreciably in the stem. Ca, by contrast, showed a marked decline in the stem under nitrogen deficiency while its concentration in the leaf did not vary significantly from the control. S content also varied only slightly with nitrogen deficiency in both stem and leaf. The significance of these effects, figures for which are tabulated, will be discussed elsewhere.—Benares Hindu University.

4056. MAIER, E. A.
Implements for stubble shaving badly harvested cane.
Sugar J., 1951, **13**: 9: 16-17, illus.
Stubble shaving has been practised in parts of Louisiana for many years. The operation is performed by making a horizontal cut, one or more inches below the surface of the ground. It assists in subsequent hoeing and weed control, soil aeration, pest control and the destruction of undesirable, weak upper eyes. A brief description is given of two implements now in general use, namely the Thomson and the Castagnos shavers.

4057. SARTORIS, G. B., AND BASCOM, B. A.
The effect of flooding on flowering and survival of sugar cane.
Sugar News, 1950, **26**: 228-31, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 517.
The effect of flooding as a result of a cloudburst is recorded on the different varieties of cane grown in a variety collection in Florida.

4058. STEIB, R. J., AND CHILTON, S. J. P.
Infection of sugar-cane stalks by the red-rot fungus, *Physalospora tucumanensis* Speg.
Phytopathology, 1951, **41**: 522-8, bibl. 5, illus.
The development of this disease could be traced from initial points of infection on leaf-scar, bud, and root-band tissues into the stalks. The course of infection was followed in the field, and experiments were made which indicated that the fungus first develops behind the leaf sheaths as they pull away from the stalk and then spreads to the nodal tissues. From dipping experiments it was found that none of the fungicides

tested gave any great reduction in the number of nodes in which the fungus developed.—Louisiana Agricultural Experiment Station.

4059. HUTCHINSON, P. B., AND DALE, W. T.
A serious sugar-cane disease in British Guiana.
Nature, 1951, **167**: 998, bibl. 1.
A sugar cane disease with internal and external symptoms like "leaf-scald" (*Xanthomonas albilineans*) is widespread throughout British Guiana and is causing serious losses. A trial to determine possible resistant varieties has been laid down.

4060. CHU, H. T.
A survey on the red rot and insect damage to cane harvested as the 1948-1949 crop in Taiwan. [Chinese with English summary 1 p.]
Taiwan Sugar J. Quart., 1950, **2**: 3/4: 195-8 +maps and graphs pp. 6, bibl. 4.
A survey showed 12·1% of cane stalks in the 1948-49 crop to be affected by red rot, 2·2% being due to *Colletotrichum falcatum* and 9·9% to insect damage. This was calculated to represent a sugar loss of 7–8%, equivalent to 47,000 to 55,000 tons. The damage found in different districts and among different varieties is indicated.

4061. TCHOUVAKHINE, P. V.
Pentodon idiota Herbst. nuisible à la canne à sucre. (***Pentodon idiota* damaging sugar cane.**)
Ent. Phytopath. appl. Tehran, 1949, No. 9, pp. 11-12.
The distribution and biology of the borer *Pentodon idiota* are described. Control measures are the collection of adults, good cultivation and the application of preparations containing HCH.

4062. ANDRADE, A. C., AND PUZZI, D.
Resultados preliminares de experiências para controlar o percevejo castanho em cana de açúcar. **(Preliminary results of experiments on the control of *Scaptocoris castaneus* in sugar cane.)**
Biológico, 1951, **17**: 44-9, illus.
The soil insect, *Scaptocoris castaneus*, has recently been found to cause serious damage in Brazil on the roots of sugar cane. A series of control experiments was carried out at Ribeirão Preto, using BHC, DDT and toxaphene in various quantities in the planting furrows. The effects on the pest population, germination of the setts and growth of the plants were studied, as well as the residual action of the insecticides. Preliminary results indicate that the most satisfactory of the treatments tested are 10% toxaphene, at the rate of 60 g. per 20 m. of furrow, and BHC, 1% gamma isomer, at the rate of 120 g. per 20 m. of furrow.

4063. CHEN, M. T.
An ecological study of sugarcane woolly aphis in the Fukien Province with special reference to its natural enemies and control. [Chinese with English summary 1½ pp.]
Taiwan Sugar J. Quart., 1950, **2**: 3/4: 228-44, bibl. 15.
The life history, host plants, natural enemies and control of the sugar cane woolly aphis, *Ceratovacuna lanigera*, were studied at the Fukien Christian University during 1944-45. The pest produced significant reductions in stalk length and number of green leaves but did not affect stalk diameter appreciably. The woolly aphis was found to hibernate on 3 species of grass in the neighbourhood of sugar cane fields. Eleven natural enemies are listed. For control good results were obtained with the brush method when this was applied in the period after winged females disappeared. Spraying with a 2% soap solution or with a 10% solution of a seed extract from *Croton tiglium* gave promising results.

4064. SCOTT, W.
The industrial utilisation of sugar cane by-products.
[*Publ.*] *Caribbean Comn. centr. Secretariat*, 1950, pp. 121, bibl. in text.
This survey is largely concerned with developments in the United States, and was made with the object of indicating what by-products of the cane sugar industry are now being produced on a commercially successful basis. The subject is discussed under the following main headings: the manufacture of various products from bagasse, products from molasses, sugar cane wax.

Tea.

4065. HARLER, C. R.
Tea planting in Southern Rhodesia.
Nyasaland agric. Quart. J., 1950, **9**: 108-15.
The conditions under which four estates have been established in S. Rhodesia are described. One estate has an average annual rainfall of only 25 inches, but is irrigated; the others, near the Portuguese border, have rainfalls of 43, 48 and 52 inches respectively. The main difficulties are labour shortage and drought. It is thought that 18-month-old stumps will resist drought better than younger seedlings. The prospects of planting tea in the higher and wetter Inyanga plateau are discussed. C.W.S.H.

4066. ANON.
Some tea is already coming from New Guinea highlands.
Pacific Isl. Mon., 1950, **20**: 11: 51-2, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 586.
Notes are given on the 7-acre trial plantation of tea in the Ramu Valley, New Guinea, established in 1939 by the Aiyura Research Station with seed from British Borneo. Some tea has already been manufactured from this plantation.

4067. KURSANOV, A. L.
Tannin substances of the tea leaf in relation to the problem of increasing the quality of tea. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1951, No. 2, pp. 44-52.
This is a study of the biological synthesis of polyphenols and the seasonal variation of the tannin content of tea leaves. The results are discussed in relation to environment, varieties, and raising new varieties.

4068. Brilliant, V. A., and Muhina-Begačeva, V. A.
The effect of shading on the growth and gas-exchange of tea. [Russian.]
Bot. Žurnal, 1951, **36**: 146-59, bibl. 2.
Growing tea plants under shade enables one to study the effect of two factors of the environment, viz. low light intensity and high moisture content of the air, and in some cases these two factors can be analysed. In experiments described, when the plants were grown under gauze, for shade, there was a positive reaction by Chinese tea which, under those conditions, showed high photosynthesis and increased growth. Japan tea under gauze showed a significant diminution of photosynthesis with weak growth, though in the greenhouse with high relative humidity it grew well. Ceylon tea shaded showed diminished photosynthesis and weak growth.

4069. Muhina-Begačeva, V. A., and Brilliant, V. A.
The effect of high air moisture on growth and gaseous exchange in tea. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **77**: 133-6, bibl. 2.
Seedlings of two varieties of tea were grown in a culture chamber with 98–99% relative humidity for comparison with corresponding plants in a control chamber with 76–80% relative humidity. High humidity had a positive effect on growth, chlorophyll content of leaves, photosynthesis and mass of foliage. The effect on respiration was variable.

4070. van Emden, J. H.
Over de vegetatieve vermeerdering van de theeplant (*Camellia sinensis* var. *assamica*). **(On the vegetative propagation of tea.)** [English summary 3½ pp.]
Arch. Theecult., 1950, **17**: 113-41, bibl. 11, illus.
In view of the importance of propagating clonal material of tea resistant to blister blight, the problems of vegetative propagation and the results of recent investigations on the subject are reviewed. For rapid multiplication of selected clones, budding and couple grafting are recommended, as by these methods a single bud may produce a bush capable of supplying soft wood for cuttings or further budding within a few months. Results obtained with the Forkert and V-budding methods are tabulated. For propagating material intended for field planting, the use of cuttings is recommended, as there are indications that the use of a stock restricts vegetative growth. The conditions required for the rooting of cuttings are discussed in detail. The growth substances naphthaleneacetic acid and indolebutyric acid considerably reduce the time required for rooting.

4071. Laycock, D. H.
An experiment on the spacing of tea.
Nyasaland agric. Quart. J., 1950, **9**: 103-8.
Over a 9-year period spacing at 3½ ft.×3½ ft. gave a higher yield than wider spacings, and 4 ft.×4 ft. gave a higher yield than 5 ft.×5 ft. Yield per bush differences did not all become significant until the sixth year by which time competition between the closer spaced bushes was limiting their average yield. Cost figures showed that spacing at 3½ ft.×3½ ft. gave the highest return. C.W.S.H.

4072. Ali-Zade, M. A.
The effect of irrigation on the growth of young tea shoots. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **73**: 1057-9, bibl. 4.
Results of experiments carried out in the sub-tropical region of the Azerbaijan S.S.R. show that irrigating tea bushes increases the length and width of the leaves of all three flushes.

4073. Laycock, D. H.
An experiment on methods of pruning [tea] and length of pruning cycle.
Nyasaland agric. Quart. J., 1950, **9**: 75-84.
Over a 9-year period, clean-pruning, in which the bushes are pruned and cleaned of dead wood, twigs and banjhi shoots, gave higher yields than "cut-across" pruning. A 2-year cycle of clean-pruning was superior to a 1-year cycle and gave a higher yield than a 3-year cycle, though the latter difference was not significant. Cut-across treatments gave higher yields for the first three years, but after that the beneficial effect of clean-pruning became apparent. It is recommended that, with manuring at the rate of 60-80 lb. N per acre, a 3-year cycle should be used. C.W.S.H.

4074. van Hell, W. F., and Veenstra, H.
Voorlopige resultaten van een tweetal proeven ter bestrijding van de blisterblight-ziekte in gesnoeide theetuinen. **(Provisional results of two experiments on the control of blister blight in pruned tea gardens.)** [English summary 2½ pp.]
Arch. Theecult., 1950, **17**: 77-111, bibl. 2, being *Meded. alg. Proefstat. A.V.R.O.S. alg. Ser.* **61.**
Two spraying experiments for the control of blister blight were carried out in the tea district of Pematang Siantar, Indonesia. In the first the effectiveness of 12 commercial preparations was compared. The weight percentages of infected leaves on all sprayed plots was lower than on the control, the greatest reduction occurring on plots sprayed with copper preparations. Infection during the 4 weeks following spraying was also lowest in the copper-sprayed plots, and leaf production was greatest. Which of the copper preparations gave the best results has not yet been determined. In the second experiment the optimum concentrations of the copper preparations "Koper Sandoz" and "Koneprox" were determined. Provisional results indicate that satisfactory control can be obtained on low-pruned tea bushes with 0·2% "Koper Sandoz" or 0·4% "Koneprox", both with 0·05% Stanvac Spreader A. Spraying should begin shortly before the buds start to swell and should be continued until shortly before the tip stage. Special care must be taken to cover the stems of young shoots.

4075. Verhaar, G., and Couwenberg, J. F.
Theebereiding zonder normale verflensing. **(Tea manufacture without normal withering.)** [English summary 1⅓ p.]
Arch. Theecult., 1950, **17**: 171-221, illus.
In an attempt to rehabilitate tea estates on which the factories had been destroyed, the possibility of reducing

the moisture content of tea leaves by pressing was investigated. It was found that the fresh leaf has to be rolled before pressing. A hand-driven press designed by the C.P.V. Research Station is illustrated. The pressed juice contains 65–75 g./l. solid matter, of which one-third is tannins. Losses of solid matter were avoided by returning part or all of the juice during rolling or fermentation. A system of mixing the pressed leaf and withered leaf in certain proportions before pressure rolling gave very satisfactory results.

Other crops.

4076. JAIN, N. L., AND OTHERS.
Cashew apple products.
J. sci. industr. Res. India, 1951, **10A**: 209-10, bibl. 4.

A brief description is given of experiments designed to find ways of removing the astringency from cashew apples. Cooking the fruits in 2% common salt solution for 3-4 min. or steaming for 5 min. at 5 lb. pressure removed it. Methods used for preparing juice, syrup, jam and candied peel are outlined.—Centr. Food technol. Res. Inst., Mysore.

4077. SCHROEDER, C. A.
Fruit morphology and anatomy of the cherimoya.
Bot. Gaz., 1951, **112**: 436-46, bibl. 11.

A study was made of several varieties of cherimoya (*Annona cherimola*) growing in California. The fruit is a syncarpium formed by the fusion of simple carpels into a solid mass. The fruits were classified into five general types according to the nature of the fruit surface. Differences between these types included variation in the density of epidermal hair and stomata. The anatomy of the fruit and seed is fully described. The carpellary wall of the fruit contains starch but this rapidly disappears as the fruit softens. The parenchyma of the carpellary wall and the seed endosperm contain oil idioblasts, though the endosperm cells are mostly filled with starch. C.W.S.H.

4078. SONWALKAR, M. S.
A study of jackfruit [*Artocarpus integrifolia*] seeds.
Indian J. Hort., 1951, **8**: 2: 27-30, bibl. 1.

Observations were made on 4 ripe fruits weighing 25 to 38 lb. each and are here recorded. Number of seeds varied from 378 to 491 and individual seeds weighed from 1 to 7 g. each. Polyembryony was rare. Germination—which occurred over two months—was highest in the heavy seeds, which also retained their viability longest. Soaking in water for 24 hours before sowing accelerated germination. Germination was best in seeds removed from perianth lobes. Vigour of seedling was closely associated with seed size. Raising in pots was preferable to raising in seed beds.

4079. PRADYUMNA SINGH, M.
Grade and quality of the chikoo fruit [sapodilla].
Indian J. Hort., 1951, **8**: 1: 11-17, bibl. 3.

The relationship between fruit size and seed number, seed weight and sugar content was examined in fruits representing each of the 4 grades under which sapodillas were sold in the local market. Uniformly high positive correlations were obtained between fruit weight and seed weight and sugar content. A negative correlation existed between fruit weight and its length/diameter ratio. These results suggest that attempts to produce seedless sapodillas may succeed only at the expense of size. [The abstractor has, however, seen large seedless sapodillas in the West Indies.]—Citrus Fruit Res. Scheme, Madhya Pradesh.

Noted.

4080.

a VAN AGGELEN-BOT, G. M.
Onderzoekingen betreffende het steken en zuigen van *Helopeltis antonii* op thee. **(Investigations on the piercing and sucking of *Helopeltis antonii* on tea.)**
Arch. Theecult., 1950, **17**: 151-69+figs. pp. 17.
A translation from the English, without indication of origin.

b ALLNUTT, R. B.
Pineapple possibilities in the Leeward Islands.
Mon. Inf. Bull. Caribb. Commn., 1950, **4**: 535-7, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 744.

c ANON.
Ceylon gaat cafeïne uit thee maken. **(Ceylon is to make caffeine from tea.)**
Fin. Dagbl., 14 March, 1950, p. 1, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 242.
Tea waste contains approximately 2% caffeine.

d ARAUJO, R. L.
Dados bionômicos de uma lagarta do cafeeiro *Dalcera abrasa* Herr.—Sch. 1854 (Lep., Dalceridae). **(Biological data on a coffee caterpillar (*Dalcera abrasa*).)**
Biológico, 1951, **17**: 55-7, illus.

e DAS GUPTA, N. N., DE, M. L., AND RAYCHAUDHURI, S. P.
Structure of sannhemp (*Crotalaria juncea* Linn.) mosaic virus with the electron microscope.
Nature, 1951, **168**: 114, bibl. 10, illus.

f DODDS, H. H.
The sugar industry in Mauritius; a brief survey of its development.
S. Afr. Sugar J., 1951, **35**: 107, 109, 111.

g DE GODOY PASSOS, H.
Café—adubação, replanta e conservação do solo. **(Coffee—manuring, replanting and soil conservation.)**
Bol. Super. Serv. Café, S. Paulo, 1950, **25**: 788-96, illus.

h GOKHALE, N. G.
Air and water relationship in soils.
Ser. Tea Res. Inst. Tocklai **49/1**, 1951, sheets 2.

i GOSSWEILER, J.
Flora exótica de Angola. Índice dos nomes botânicos actualizados e sinónimos. **(The exotic flora of Angola. Index of present botanical names and synonyms.)**
Agron. angol., 1950, No. 4, pp. 167-94.
An index to the annotated inventory of non-indigenous plants grown in Angola [see *H.A.*, 21: 1013].

j HARLER, C. R.
Present trends in tea withering.
Spice Mill., 1950, **73**: 10: 47, 49, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 769.
An account of the method of withering used in China.

k VAN DER KNAAP, W. P.
Polyploidie ten dienste van de koffie-selectie. **(The use of polyploidy in coffee breeding.)** [English summary ⅔ p.]
Arch. Koffiecult., 1950, **17**: 101-19, bibl. 19.

l LAROCHAS, L.
L'exploitation du palmier à huile en Afrique Française. **(Cultivation of the oil palm in French Africa.)**
Rev. int. Prod. colon., 1951, **26**: 62-3, from abstr. in *Oléagineux*, 1951, **6**: 385.

m LLADDIS, C.
Some notes on papain production.
Pacific Isl. Mon., 1950, **21**: 1: 50-1, 63, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 684.
Papaw culture and preparation of papain.

n NAYAR, T. G.
Short notes on banana varieties at Trinidad.
Indian J. Hort., 1951, **8**: 31-9, bibl. 9.

o QUEENSLAND GOVERNMENT STATISTICIAN (SOLOMON, S. E.).
Queensland sugar production.
Aust. Sugar J., 1951, **42**: 782-7.
For the period ending 31 March, 1950.

p REYES, G. M.
A problem posed by the Philippine sugar industry [sugar cane mosaic].
Sugar News, 1950, **26**: 167-70, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 460.

q RIPERT, F.
La Réunion, terre du sucre. **(Réunion, land of sugar.)**
France Outre Mer, 1950, **28**: 31-8, from abstr. in *DocumBl. trop. Prod. Amst.*, 1950, **5**: 379.

r ROBERTS, E. A. H.
Firing of tea.
Ser. Tea Res. Inst. Tocklai **28/1**, 1951, sheets 3.

s SUN, V. G.
The causes of the decrease of the available sugar percentage in the cane from the west central coastal plain in Taiwan and some suggestions for recovering it. [Chinese with English summary 1½ pp.]
Taiwan Sugar J. Quart., 1950, **3**: 1: 134-56, bibl. 31.

t DU TOIT, J. L.
Fertilisers in the sugar industry.
S. Afr. Sugar J., 1951, **35**: 147, 149, 151, 155, illus.
A comparison of prices and values.

u VAN ZWIETEN, P., AND HOEFFELMAN, H.
Beschouwing over warmteverbruik bij het drogen van thee. **(Considerations on heat utilization in the drying of tea.)**
Arch. Theecult., 1950, **17**: 143-9, illus.

NOTES ON BOOKS AND REPORTS.

Books.

4081. ANLEY, G.
Alpine house culture for amateurs.
Country Life, London, 2nd edition, 1951, 8½×5½ in., pp. 167, bibl. 24, illus., 15s.

The temperamental treasures whose brief duty in the outdoor rock garden leads them to the grave with such monotonous and expensive regularity will, it seems—given the protection of a frame in winter, a properly prepared soil and unlimited fresh air—attain a mundane immortality extremely gratifying when previous failures are recalled. It is the author's well-tested opinion that the permanent homes of these difficult plants should be in frames and shelters open to the sky for most of the year while the alpine house serves merely as a showroom in which the finished goods can conveniently be displayed. Part I of the book deals with appliances and cultural routine. A strong case is made out for the scree frame in which the plants are grown naturally (without pots) and can be shielded from unfavourable weather. A compost made up of equal parts of good fibrous loam and broken tile or brick crushed and screened to pea size is recommended as a mixture in which—heartening news indeed—nothing so far has been known to fail. Part II is made up of lists of plants under various convenient groupings, the most catholic being that headed "General Collection". Name, colour, and time of flowering are tabulated. These lists are long, and as page succeeds columned page only occasional interventions by the author dashing horizontally through the serried ranks of verticals save the reader from complete hypnosis. The solid appearance of the columns is not diminished by the reiteration of the generic name before each specific; thus *Saxifraga* appears 52 times in succession and *Rhododendron* 73. The specific names, cut off from free access by this repetitive hedge, do seem definitely more difficult to locate. However, idiosyncrasies of this nature though annoying to some may be pleasing to others and no doubt have a reason. They do not affect the value of this book as a first rate guide to a fascinating study.

G.St.C.F.

4082. ARENDS, G.
Mein Leben als Gärtner und Züchter. **(My life as gardener and breeder.)**
Grundlagen u. Fortschritte im Garten- u. Weinbau, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1950, Heft 91, 8½×6 in., pp. 179, illus., DM. 6.

The memoirs of a renowned German horticulturist. The story of Arends' life is a chapter of horticultural history that takes us back to 1880. After initial training in his own country, in Italy and in England he settled down in Wuppertal-Ronsdorf in 1888 to found a small firm, for which he was better equipped with keenness and varied experience than with capital. Financial success, however, soon followed and enabled him to concentrate on his favourite field, viz. the development of outstanding varieties of *Primula obconica* and of hardy perennials. During the latter part of the second world war the famous establishment was all but destroyed, but the author lived to build it up again and to restore the soil to flower culture. It is always stimulating to glance through the biography of a man whose life is devoted to a purpose sympathetic to oneself. In this case the reader will also find much that interests him in the descriptions of the origin of Arends' new varieties, which fill about one-half of the book.

V.H.G.

4083. BERG, J., AND KRÜSSMANN, G.
Freiland-Rhododendron. **(Growing rhododendrons out of doors.)**
Grundlagen u. Fortschritte im Garten- u. Weinbau, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1951, Heft **83**, 8½×6 in., pp. 164, bibl. 37, 204 illustrations and a colour chart, DM. 8.

This book, a publication of the German Rhododendron Society, is the first monograph on the genus *Rhododendron* in German, and special acknowledgement is made to the British Rhododendron Association for permission to use their published material. The authors are a horticulturist (J.B.; Bremen Botanic Gardens) and a nurseryman who draw on their own practical experience. Their aim is to satisfy members of the horticultural fraternity, professional and amateur, not the scientific botanist. Many aspects of rhododendron and azalea culture under German conditions are covered and methods of propagation by seed, cuttings, grafting, layers, and division are dealt with in some detail. About two-thirds of the book are devoted to lists of (1) wild species (pp. 51) with descriptions and numerous line drawings, (2) large-flowered rhododendron hybrids (pp. 23) and (3) azalea hybrids (pp. 16) with tabulated notes on colour and time of flowering. Lists (1) and (2) also indicate the degree of hardiness. Finally there is a chart of eighteen flower colours from lemon yellow to violet, with five shades in each colour.

V.H.G.

4084. BROOKE, J.
Peaches, apricots and other stone fruits.
Faber & Faber, London, 1951, 9½×5½ in., pp. 163, illus., 16s.

Mr. Justin Brooke, the widely famed grower of peaches on a commercial scale as bush trees, has already described his methods in *Peach orchards in England*. The information in that book is now revised and directions for growing other stone fruits are added. He is a man of revolutionary ideas, but he realizes that he has little proof for many of his "large claims" and invites his reader to arm himself with a "healthy scepticism". Much that he believes and practises appears to be contrary to the evidence of sound experiments and it will be interesting to see how many of his ideas will be adopted by fruit-growers, even on the experimental scale that he pleads for. Fourteen of the twenty-three chapters of the book deal with peaches; the development of his farm at Clopton Hall, sites, varieties, planting, cultivation, manuring, picking and marketing, the effects of severe and mild winters, pests and diseases, and the utilization of unmarketable fruit. Chapters follow on nectarines, apricots, greengages, cherries, and a standardized method for pruning all stone fruits. Other chapters deal with the control of silver leaf by bark-slitting, recommended rootstocks and the problem of marketing small quantities of fruit. Mr. Brooke presents his ideas in an interesting and provocative way and makes one wish to try them out if only to prove him wrong. It would, however, be valuable to have figures for the crops harvested, on an acreage basis, so that the grower who has not seen Mr. Brooke's farm may judge for himself the success achieved by these methods. The book is well indexed and is illustrated by many photographs, though some of these are not very clear.

H.B.S.M.

4085. CATCHPOLE, N.
Simple pruning.
W. H. & L. Collingridge, London, 3rd edition, 1946, reprinted 1949, 7½×5 in., pp. 128, illus., 7s.

In the first two chapters of this small book, on the purpose and form of pruning, the author gives practical examples of diverse plants to support the theoretical work he is describing, while adequate illustration by plates and line drawings simplifies the terminology of fruiting and vegetative parts of plants. The pruning of flowering shrubs, clematis, climber, rambler and bush roses is covered as well as the pruning of tree, bush and miscellaneous fruits, with special chapters on the Lorette system of pruning, hedge and topiary work and finally a calendar of pruning operations. The book is adequately indexed. Considering its price it is well produced and the illustrations are clear and descriptive. Errors are few, but perhaps in a future edition the definition of dehorning on p. 90 could follow more closely the excellent illustration of this operation opposite p. 32. The treatment of outdoor vines might be added. The reviewer hopes that this book may find its way into the hands of some of the "professional gardeners" of suburbia, so that specimen shrubs may retain some of their natural habit and fruit trees yield fruit as well as shade.

A.P.P.

4086. CHANDLER, W. H.
Deciduous orchards.
Henry Kimpton, London, 2nd edition, 1951, 9½×6 in., pp. 436, bibl. 272, 113 figs., 46s.

The first edition of Professor Chandler's book was a landmark in pomological literature. For almost the first time a book on growing approached the subject not from the standpoint of practical technique but rather from that of the physiological responses of the tree. The author expressed the opinion that the practical

aspects of fruit cultivation could best be acquired by experience on a first-class nursery and that the function of a college textbook should be rather to provide the skeleton of an orderly, detailed system of knowledge about trees, as a basis for a course aimed at explaining the underlying problems of tree behaviour. In this endeavour he succeeded most admirably.

On his retirement from the Professorship of Horticulture in the University of California, Professor Chandler has found time to revise and bring up to date his textbook, making it even more valuable. While the greater part of the text is unchanged there has been extensive re-arrangement of the sections, particularly the first half, which deals with all aspects of tree growth and development in general. Certain subjects have been re-written in the light of recent research, especially where hormone mechanisms are involved, and a list of 272 recent papers, published since the first edition, has been added.

A great virtue of the book is that, unusually for an American textbook, work in this country receives as much attention as that of the U.S.A. The book is therefore of the utmost value to British students and should become the standard work on scientific pomology. It is unfortunate that, in spite of a small reduction in size, the cost is more than double that of the original edition. R.H.S.

4087. Cochran, W. G., and Cox, G. M.
Experimental designs.
John Wiley & Sons, Inc., N. York, 1950, 9×6 in., pp. 454, bibls., $5.75 or 46s.

The aim of this book is to describe and explain the many types of experimental design that have been evolved, and it achieves its end very well. Though not very easy to read, it is both comprehensive and practical and makes a valuable work of reference. Horticulturists working with long-lived plants should, however, be warned that, with their material, experimental design in the sense considered by this book is not usually of first importance. Devices useful elsewhere for reducing variation by diminishing block size are apt to give disappointing results, while special attention has to be given to means of modifying treatments as the trial proceeds and the emphasis of the investigation alters. In one respect they will have cause to be grateful, for the authors pay detailed attention to the treatment of incomplete data and this is often a bugbear of long-term trials in which plants die or become abnormal, but on the whole they are likely to pass the book by as somewhat irrelevant to their needs. Those working with annual and biennial plants, however, whose problems resemble rather those of the agriculturist, have good reason to welcome it, though it is to be hoped that they will use the more complex designs only with good cause. S.C.P.

4088. Correll, D. S.
Native orchids of North America.
Chronica Botanica Co., Waltham, Mass., and Wm. Dawson, London, 1950, 10×7 in., pp. 399, bibl. 137, illus., $7.50.

In view of the large and detailed monographs which have been published dealing with the orchids of Europe, a comprehensive treatment of those of the North American continent is long overdue. The appearance of Dr. Correll's very attractive book is therefore all the more welcome. The author was for many years associated with the late Professor Oakes Ames, whose knowledge of American orchids was unrivalled, and this association is reflected in the excellence of the present work.

The orchids of North America, about 200 species in all, include a number which are popular rock- or bog-garden plants, such as the various Lady's Slippers, but there are many other hardy species which would be well worth cultivating. In addition to the hardy species, which are mostly terrestrial plants, there are some tropical or sub-tropical species restricted to the southern parts of the United States, especially Florida. These would require greenhouse cultivation, and include a number of epiphytic species, many of them very striking.

Following a short introductory chapter, the main part of the book consists of a systematic account of the various genera and species of orchids occurring in the United States and Canada, with well-designed and easily used keys for their identification. There are excellent but simple descriptions of each, while almost all the species are accurately portrayed by charming line drawings, nearly 150 in all. Dr. Correll adopts on the whole a conservative attitude as regards both genera and species, and this must be taken into account in making detailed comparisons with European orchid treatises.

Information regarding natural habitats and geographical distribution is added, together with notes on pollination, variation, hybridization and other biological features in many cases. Professor E. T. Wherry and Mr. J. V. Watkins have supplied for each species very useful notes on cultivation, which will be of special interest to horticulturists. A glossary and selected bibliography of publications on American orchids complete the text. The book is clearly and tastefully printed, and is indeed a model of what such a book should be. It will undoubtedly remain the standard work of reference on this subject for many years. V.S.S.

4089. Edelman, C. H.
Soils of the Netherlands.
North Holland Publishing Co., Amsterdam, 1950, 9½×6½ in., pp. 177, 65 figs., and map in colour, Fl. 17.50.

The history of most countries is written in their soils. In few is there such an awareness of the importance of this history as in the Netherlands. In agriculture, as in almost all other human affairs, one must be constantly looking ahead. Professor C. H. Edelman has made the experience of the past the guide to the future in his book *The Soils of the Netherlands.*

The soil has a long history, beginning with that of the geological deposits which contribute the mineral material, and with that of the vegetation which, through the ages, has supplied the organic matter. In many parts of Holland organic material constitutes the entire substance from which the soil has grown. Geological events have controlled the levels of the land and the action of the rivers, but climate has contributed the rainfall and has had a large part in deciding the nature of the vegetation.

The virgin soil is the resultant of these numerous and deeply interrelated factors. But extremely little soil

is now virgin in the Netherlands. Man's immediate activity upon occupying a piece of land is to establish a vegetation suited to his needs, and this generally results in the destruction of the natural one. The gradual encroachment of heather where once broad-leaved forest grew is but one instance. The resulting podsolization has had a great effect upon European agriculture.

With their extremely dense population the people of the Netherlands have continuously struggled to win more land upon which to grow their food. From their home on the clay soils bordering the distributaries of the Rhine delta, they have drained peat bogs and reclaimed the saltings of the coast. Now they are engaged upon draining the floor of the sea itself. It is a fallacy to imagine that these are all rich and fertile soils; the reverse is often the case. The work has been carried through with a combination of remarkable courage, skill and industry, but mistakes have sometimes been made. Peats drained to too low a level dried irreversibly and lost their power to soak up water from beneath. To maintain the desired water level is not easy, even in a countryside which may appear absolutely flat to the eye. Thus, the value of land with a 55 cm. water-table in the bulb-growing district of Haarlem appears fantastic, until one realizes that air and water are even more important to a plant than food. The different kinds of soil react dissimilarly to draining. The peats, which once stood above the clays lining the margins of the rivers, shrank when the water was taken from them, and now lie well below. These and many other problems confront the agriculturist. Often the soil itself has been made by the farmers to suit their requirements. Soil has been brought by barge from The Hague to build up the intensive market-gardens of the Westland. Sand dunes have been carried away for building materials, and upon their carefully stirred and relaid foundations the bulb fields have grown.

For such operations to be carried through effectively, a detailed knowledge of the soil is essential. As long ago as 1867 Staring propounded a classification of the soils of the Netherlands which has found a place in the curriculum of all the schools of Holland. Among farmers there is a wealth of soil lore and terminology. This presented the soil scientist with a great deal of material, but also with the problem of fitting practical conceptions, based on sound tradition, into a new international classification. Professor Edelman has accomplished this task with conspicuous success. His book is to the student of soils what a flora is to a man concerned with plants. It is not a purely theoretical work, but an intensely practical one, emphasizing the relationship of the soils to one another and describing the development and agricultural character of each. In a future edition one would like to see even more account taken of agriculture.

The systematic soil survey has, as yet, covered only limited areas and, in consequence, the detailed knowledge of some districts is greater than that of others. One point which stands out is the extreme complexity of the distribution of many of the alluvial soils, which necessitates mapping on a large scale. This places great obstacles in the way of publication of useful soil maps. This very detailed soil distribution matches up with a very intensive soil utilization. Already in the Betuwe the soil survey map is made the basis of recommendations for fruit planting by the growers' co-operative organization.

Although a glossary of Netherlands terms and an index would have been a help, and in rare cases the translation has left the exact meaning in doubt, as a whole it is commendably clear. The numerous kinds of soil are described in detail and there are plenty of helpful diagrams, as well as some pleasing photographs. The Provisional Soil Map of the Netherlands, on a scale of 1: 400,000, is reproduced in colours. It is a remarkably fine map, showing a great wealth of detail with a high degree of clarity.

Professor Edelman has conveyed a picture of a country which, though small in size and limited in its geological and climatic range, is rich in the variety of its soils. He has made it plain that it is only a preliminary account of the soils of the Netherlands and their utilization, but it is a beginning very well made. It is a book packed with information for the soil scientist who studies the soil in the field. It will help to pave the way for a steadily increasing intensiveness of land utilization, which is an essential part of the economy of the Netherlands. Many of its lessons are applicable far beyond the country which it describes. B.S.F.

4090. GARDNER, V. R.
Basic horticulture.
Macmillan Co., New York and London, revised edition 1951, 9½×6 in., pp. 465, illus., 36s.

Basic horticulture was first published in 1942 [for review, see *H.A.*, 12: 1562]. It is a textbook worthy of the intelligent student, for the author is concerned less with the facts and precepts than with the way in which plants grow and react to their environment, illustrating his account with examples from horticultural plants and practices. That an understanding of these fundamental principles can go a long way to solving common horticultural problems is shown by the choice of eminently practical questions at the end of every chapter. Since the book was first published, new developments of fundamental interest have arisen in the fields of growth substances and weed control research, and in this revised edition a new chapter has been inserted on each of these subjects. Another major addition to the text is the final section, headed "Suggested laboratory exercises", in which a very sensible supplementary course of field studies is suggested which can be readily adapted to local conditions. Other alterations have been limited to the insertion of a few examples from modern horticultural practice, such as the use of pelleted seeds and the method of double-working rubber trees for control of *Fusicladium macrosporium*, which serve to bring the text up to date and thereby to hold the student's interest. P.R.-D.

4091. GODDARD, J. H.
The new chrysanthemum treasury.
W. H. and L. Collingridge, London, 1951, 9×6 in., pp. 262, illus., 15s.

The New Chrysanthemum Treasury is pleasantly written by an amateur of some considerable experience in growing for exhibition, and the chapters dealing with exhibiting and staging are full of useful information.

Mr. Goddard amply demonstrates his skill as a judge in offering 10 pages of useful hints. The book contains 8 excellent colour photographs and 91 clear pictorial half-tones.

It is unfortunate that the author has not given the attention to actual cultivation which the subject deserves. From a total of 256 pages, 102 are devoted to the classification of varieties, approximately 600 of them. While this is of immense value as a reference, it will present an enormous headache to the beginner. When will "literary-growers" learn to limit their recommendations ?

The little cultural information, while offered in a pleasant friendly fashion, contains too much padding and could have been provided in about one-third of the space, and the General Index, which is contained in two pages, gives an indication of the scanty factual information.

Some stopping dates are provided and these serve as a useful guide, but no reference is made to "natural breaks", and the term "pinching" is not commendable. No reference is made to the production of selected stock plants, a feature which ought to be of importance to the amateur, and confusion is often caused by not indicating the types referred to in the cultural notes.

Important omissions are the quantities of chalk, fertilizer, insecticides, etc., which should be used. An amateur requires strict guidance on these points and it is confusing to have complicated composts suggested for one operation and John Innes composts for another. While appreciating the difficulty of steam sterilization for the amateur, at least it would simplify his lot to be given, say, J.I. 1 for cuttings, J.I. 2 for 60s, J.I. 3 for 48s and J.I. 4 for 16s. An example of this confusion is offered on p. 35 when J.I. 3 is discussed in conjunction with potsful and barrow-loads of ingredients, and the mixture of soot and lime is not to be recommended. Feeding would be advisable up to the time of cutting the blooms and should not stop when plants are housed. There is no mention of disbudding of mid-seasons before housing, and the scant attention paid to Bishop Bug is surprising. In controlling pests little importance is given to DDT, and amateurs would be better advised to use BHC rather than HETP. While, moreover, the author indicates the trouble necessary in producing pot-grown varieties, he leaves the impression that early flowering varieties can be grown on almost any kind of soil and with but meagre cultivation.

The author's chief love is undoubtedly the production of flowers for exhibition, but the *Chrysanthemum Treasury* would have been of greater value if some information had been given on the growing of pot chrysanthemums suitable for indoor decoration: while specimen plants are illustrated, no mention of them is made in the text.

The book is expensive at 15s., but no doubt the inclusion of the colour plates has influenced its price. J.H.

4092. HAUMAN, L., AND OTHERS.
Flore du Congo belge et du Ruanda-Urundi. Spermatophytes. Vol. II. **(The flora of the Belgian Congo and Ruanda-Urundi. Spermatophytes.** Vol. II.)
I.N.E.A.C., Bruxelles, 1951, 10×6½ in., pp. 609, illus., 300 fr.

This is the second volume of the series of which Vol. I was reviewed in *H.A.*, 19: 1655. It includes the families Chenopodiaceae to Hamamelidaceae, again with keys for the identification of genera and species, descriptions of species, bibliographies, synonyms, geographical distribution, habitats, vernacular names, and uses. The illustrations are 57 plates of excellent drawings showing habit and morphological detail of particular plants, 5 photographs, 9 text figures, and a coloured frontispiece of *Sedum churchillianum* Robyns and Boutique.

4093. HUGHES, H.
Fruit cultivation for amateurs.
W. H. & L. Collingridge, London, 1951, 9×5½ in., pp. 477, illus., 25s.

It is remarkable that there still appears to be a market for yet another major work on fruitgrowing for the amateur. Those, however, who have not yet acquired a satisfactory book on this subject may well find that of Miss Hughes to be just what they need. Certainly it can claim to be the most comprehensive and up-to-date, and the whole subject of fruitgrowing is covered in close detail in its 477 pages. The book is divided into three parts. The first deals with general subjects including planning, soils, planting, frost damage, pollination, propagation, pruning, grafting, pest and disease control, renovation of neglected trees, harvesting, storing and exhibiting. Part II describes the culture of each hardy fruit with reference to many of the points raised in a general way in Part I and includes quite extensive lists and descriptions of varieties. Almonds, cobnuts, filberts and walnuts are also covered in this part. Part III consists of two chapters on fruits under glass, one of which is devoted solely to grapes. The book is lavishly illustrated with over 100 of the best photographs that have appeared in a book of this nature. There are also many line drawings and two indexes, one general and the other of pests, diseases and functional disorders. The proof reading has been very carefully done. The information is largely based on the results of research and, where these are lacking, on the experience of successful horticulturists. The author has an easy conversational style, though the frequent intrusion of "personally I" has irritated the reviewer.

A book of this scope usually includes some errors, but some of those spotted seem rather obvious. Thus DDT is normally applied to kill immature, not adult, capsids (p. 141), blackberries and hybrid berries are not "picked without the plug" (p. 252), the linking of Myrobalan B and Common Plum as "incompatible with some varieties" (p. 357) is unfair to the former and flattering to the latter, and the relative vigour of the plum rootstocks as given (p. 358) seems unusual. The new word "mercurocides" (p. 140) has nothing to commend it, and organic mercuric (p. 139) is almost equally bad. These and similar small blemishes merely show how difficult it is for an author to be sufficiently knowledgeable in all aspects of a subject to avoid them and they do little to mar the general excellence of the book. This book is very good value for money, and he who cannot afford a copy for himself should bear it in mind when wishing to give someone a valuable present.

H.B.S.M.

4094. JACOBSEN, H., VOLK, O. H., AND HERRE, H.
Mesembryanthemaceae; Ein Buch für Gärtner und Pflanzenliebhaber. (*Mesembryanthemaceae;* **a book for gardeners and plant lovers.**)
Grundlagen u. Fortschritte im Garten- u. Weinbau, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1950, Heft **84**, 8½×6 in., pp. 128, bibl. 44, illus., DM. 5.80.

A professor of botany (O.H.V.) has joined forces with two curators of botanic gardens, the one (H.J.) from Kiel, the other (H.H.) from Stellenbosch, South Africa, to produce a monograph on the most curious plant family grown in our rock gardens. The collaboration of the three authors attempts to secure that the account of the fascinating botanical features of these succulents is balanced by a discussion of the cultural requirements of the family as a whole and of some horticulturally important groups and genera in particular. The general part (pp. 7-51) will appeal to all lovers of exotic plants, while the detailed identification key for genera (30 pp.) and the index of genera and species, including synonyms (47 pp.), should be of great interest to the specialist. V.H.G.

4095. KING, F. C.
The weed problem.
Faber & Faber, London, 1951, 7½×5 in., pp. 164, 8s. 6d.

It is somewhat refreshing to turn for a moment from the monumental proceedings of some of the Herbicide Conferences of North America, where more and more selective and potent chemicals are found to deal with the weeds which threaten to stifle cultivated crops, to the small volume of a disciple of Sir Albert Howard, in which are championed not the measly bits of mildewed weed which are apt so regrettably to disgrace our garden, but good strong 2-ft. groundsel bursting with health and vigour and destined to build up the strength of millions of micro-organisms essential to crop production. A plentiful supply of weeds, mulching, and a minimum of digging are what Mr. King advocates. Weeds are our friends and they prevent soil deterioration, they absorb plant poisons and might well obviate the necessity for rotations, if properly studied. Are they really such terrible bugbears, asks Mr. King, in their role of host to various diseases, and when we destroy the weeds surely only then does the disease turn to crops, its second choice? It is all very perplexing, but to one reviewer, at least, Mr. King puts up a plausible case. In some parts of the agricultural world there is appearing some measure of revolt against spraying and re-spraying with ever more potent and dangerous chemicals against diseases and pests, which admittedly show remarkable ingenuity in developing ways of dodging the snares thus set for them. Those leading the revolution are inclined to suggest that nature should have a hand, and that the beneficial insects should be allowed a chance to see what they can achieve. The chance must be regulated, certainly, but regulation by annihilation is too drastic. Perhaps Mr. King has something after all. Whether he has or has not, he has written a fascinating book which should be read by open-minded horticulturists.

D.A.

4096. LUNDEGÅRDH, H. (translated by MITCHELL, R. L.).
Leaf analysis.
Hilger & Watts, London, 1951, 8½×5½ in., pp. 176, bibl. numerous, illus., 22s. 6d.

The fact that Professor Lundegårdh has written this book, that Dr. Mitchell has taken the trouble to translate it and that Messrs. Hilger & Watts have published it ensures a publication worth reading. The book is essentially a study of leaf analysis as a means of determining the suitability or otherwise of a soil for the growth of the plant from which the leaf material was taken; this is discussed at considerable length from its physico-chemical, physiological and utilitarian aspects and some of the many pitfalls in the diagnostic use of leaf analysis methods are pointed out. As is to be expected in a compilation of this nature, the level of significance of the data varies enormously: thus we find simple observations, statements like "mean of 3 replicates" in which the values of the replicates are not given and sometimes expressions in the form a ±b. It is in fact difficult in some cases for the reader to form any estimate of the value of the evidence. Professor Lundegårdh stresses the importance of the selection of "suitable" material for analysis and of care in interpreting the results, with both of which sentiments the reviewer is entirely in agreement. Considerable space is devoted to a description of methods for the analysis of large numbers of samples which should be of great interest to the specialist.

B.D.B.

4097. NELSON, A.
Medical botany.
E. & S. Livingstone Ltd., Edinburgh, 1951, 8½×5½ in., pp. 544, illus., 30s.

This desirable textbook may primarily be for the medical student, but it seems also, to one reviewer at least, to afford excellent light reading for the horticulturist and grower of plantation crops, and by light reading he means pleasant informative reading on a number of crops and their often hidden virtues and vices. The chemist and botanist are catered for with chapters on plant structure in relation to food quality, minerals in plants and diet, vitamins, and the effects of storing, processing and cooking, and then the different plants are considered in detail. Much attention is paid to staple crops including the cereals, pulses, etc., and to oil seeds and edible nuts.

It is with these last that the horticulturist really begins to come into his own, for from p. 243, where oil palms are considered, to p. 523, where the author dismisses his plant identification parade, there is just one item of interest after another. Does your Agricultural Advisory Officer really know the salient points of the coconut as delivered by the tree, the two quite different things connoted by the term "coconut milk", how much and what vitamins are contained in the flesh, how, roughly, desiccated coconut, copra and coconut butter are prepared and what the components are of coconut oil? If not, Dr. Nelson will tell him and afford the same sort of information on olives, avocadoes, walnuts, chestnuts, pome and stone fruits, citrus fruits, tomatoes, eggplants, capsicums, persimmons, melons, passion fruit, grapes, dates, jujubes,

currants, rose hips, pomegranates, figs, pineapples, mangoes, to list but a few of those discussed.

Separate chapters are devoted to leaf and to stem and root vegetables. The chapter on foodstuffs from the non-flowering plants including mushrooms and ferns is all too short, and surely among ferns the succulent " fiddle heads " of New Brunswick deserve honourable mention ?

Section II will be found no less interesting to the pharmacist or to the less innocent wife (or husband) poisoner, for under the heading " Vegetable drugs, poisons, stimulants and other plant products of pharmaceutical interest " most valuable hints are given on which roots to dig and which shoots to cut off or seeds to collect to allay wind in the stomach or provide a drastic but slow-acting purge or ferry one over the river Styx. So that they may not be disappointed, however, it must be admitted that appropriate methods of extracting the desired component are not usually given.

Or for the cynic's lighter moments we commend just mere contemplation of what possibilities lie even in the cutting, bunching and packing of the homely daffodil, and sending it to Aunt Susan on her birthday. Thus under " Occupational allergenic dermatites " we read, " a number of them [the horticultural bulb cutters] contract a dermatitis called lily-rash. A small papular rash appears. . . . Oozing eczema with itch follows and the condition may spread over the body ". No, a greetings card this year, we think.

But seriously, it is a most fascinating book and appealing to very many tastes, from the extremely serious-minded horticulturist to the dilettante book lover. It is well printed and illustrated, and should be in your library. D.A.

4098. North Coombes, G. A.
The fibre industry of Mauritius.
The General Printing & Stationery Co. Ltd., Port Louis, Mauritius, [Deputy Director of Agric., Mauritius], 1951, 6×8 in., pp. 85, bibl. 23, 7 pls.

The Mauritian " aloes ", plants which have given rise to the fibre industry, belong to the genus *Furcraea* of the family Amaryllidaceae and were introduced into Mauritius in the eighteenth century. The two closely related plants concerned in the industry are known locally as " aloès malgache " and " aloès créole ". Aloès malgache (or aloès vert) is dark green and the larger of the two plants, with leaves sometimes 7 to 8 ft. long. Aloès créole is light green and has a smaller leaf.

The book, which has been written mainly to arouse the interest of the Mauritian Fibre Producers, has been collated from information in numerous papers, documents, reports and unpublished data. The first three chapters cover the development of the industry from 1749 to 1930. The fourth, fifth and sixth chapters deal with the period 1930 to 1950 and describe in detail the establishment of the Government Sack Factory at Quatre Bornes, the new decorticating machines and the condition of the trend of its development. There are six appendices including notes on the comparative strength of Furcraea, Manila and Sisal ropes, comparative yields of Furcraea and Sisal cut at 6, 12 and 18 months' intervals, and a short note on the control of the pest Herbe Condé (*Cordia macrostachya*). K.L.

4099. Sanders, W. T., and Macself, A. J.
The flower garden.
W. H. & L. Collingridge, London, 3rd edition, 1951, 10×7½ in., pp. 450, illus., 30s.

Sanders's *Flower Garden*, born in 1905 and circulating ever since with unimpaired vigour through numerous editions and revisions, is once more presented, refurbished in handsome quarto and up to the minute in modern horticultural complications by A. J. Macself, for whom, as is well known, there are no gardening secrets. Part I treats of " Garden art and practice ". Garden art here means advice on the creation of the garden beautiful, couched in more or less general terms. Plans and designs for the construction of gardens of varying size and character, prominent in previous editions, have now wisely been omitted on the grounds that the garden should interpret its owner's ideas and that plans designed for purely imaginary sites seldom meet the case. Garden practice gives an outline of garden routine, including propagation. All this is concisely and effectively disposed of in some 40 pages. The remainder of the book is devoted to the plants themselves. Some 750 genera are noticed, the best species of each from the point of view of garden decoration are selected and their cultural needs are discussed. The genera are arranged alphabetically within certain well-recognized groups, hardy plants, trees and shrubs, ferns, aquatics, etc. The illustrations are admirable, the price stiff. To those who can afford it the book is destined, like its ancestors, to become a treasured tenant of their shelves.

G.St.C.F.

4100. Smith, K. M.
Recent advances in the study of plant viruses.
J. & A. Churchill Ltd., London, 2nd edition, 1951, 8×5½ in., pp. 300, illus., 22s. 6d.

This is a very useful book for the student of plant viruses, as it covers the entire field of research in its diverse aspects. Plant virus research has greatly changed since the first edition was published in 1933, and even the general format is altered in this second edition, with new chapters on Electron Microscopy and on Serology. Subjects covered in the first edition have been rearranged so that they fall logically under the chapter headings: Symptomatology; Physiology of diseased plants; Insects in relation to viruses; Methods of transmission; Methods of purification; Properties of purified viruses; The sizes of viruses; Strains, mutations and variation in viruses; Control of plant viruses; Classification and nomenclature. The chapters are not, however, equally comprehensive, those on aspects in which the author and his collaborators in research have been most active in recent years being the fullest and being supplied with more up-to-date bibliographies than the others. If references to publications after 1947 are considered (the title is *Recent* Advances), we find that the three chapters on Electron Microscopy, Serology and Control, Classification and Nomenclature have twenty-four, while the remaining eight chapters (excluding the introduction) have only fourteen different references. Their choice seems odd in some instances. Why, for example, should a reference to cacao viruses in Trinidad be cited in relation to swollen shoot diseases in West Africa,

and yet recent papers on the subject be omitted from the bibliography ? In fact the references are perhaps the weakest part of the book. On the other hand, to students and research workers a most valuable feature is the description of methods employed in the different techniques, the accounts of which are sometimes sufficiently detailed to be followed without reference to original papers, so that the book, with its other assets of clear text and excellent photographs, is indispensable to the virus laboratory. A.F.P.

4101. Thomas, W. L., and Eyre, P. W.
Early potatoes.
Faber & Faber, London, 1951, 8½×6 in., pp. 198, bibl. 22, illus., 18s.

This book describes the methods used for growing early potatoes by Mr. Thomas on his farm in Pembrokeshire. Intended for farmers and market gardeners, it is written mainly from a practical standpoint and contains chapters on the soil and its preparation, the seed and its treatment, ridging, manuring, planting, inter-row cultivation, lifting and marketing, and rotation.

Considerable stress is laid on the need to avoid over-cultivation in the spring, but the authors dismiss the practice of ploughing in the seed (prevalent in Australia and Tasmania) as not a satisfactory method. It would seem to be worthy of more sympathetic consideration. Some experiments on the influences on yield of seed size and spacing, number of sprouts per seed, depth of planting and date of first emergence are described, but the data are unconvincing owing to shortcomings in the methods of sampling and lack of experimental designs; the authors themselves draw attention to the inconsistency in yield of individual plants of Arran Pilot, the experimental material. When discussing varieties, they show little knowledge of the principles of genetics and over-simplify the potentialities of clonal selection.

Many statements occur that are without scientific justification; for example, " shallow planting gives better potatoes due to less pressure caused by the smaller amount of soil on the tuber "; or again, " potatoes which flag in the day and assume a turgid, erect position during the night crop earlier, owing to the impulses ". This tendency to confuse fact and hypothesis is misleading to the untutored reader.

On the whole, the book is written concisely and clearly and, from the practical aspect, the grower of early potatoes should find much in it to assist him.

K.S.D.

4102. Ulmann, M.
Wertvolle Kautschukpflanzen des gemässigten Klimas. Dargestellt auf Grund sowjetischer Forschungsarbeiten. **(Valuable rubber plants of the temperate zone. A report based on Russian research work.)**
Akademie-Verlag, Berlin, 1951, 10×7 in., pp. 562, bibl. in text, illus., paper cover DM. 56, bound DM. 59.

Since about 1930, when the significance of kok saghyz was first recognized, an enormous Russian literature on temperate rubber plants has accumulated, which is dispersed in over a hundred periodicals and pamphlets and is thus inaccessible to the foreigner, even if he masters the language. Western scientists interested in this field of study are therefore greatly indebted to the author for undertaking to collect all the relevant information and for presenting it in a manner which, it is claimed, renders reference to the original paper unnecessary. Repetition is avoided as much as possible by arranging the material according to subjects and not according to plants. An introductory chapter is followed by a description of the more important temperate rubber plants with special reference to their natural environment. The main body of the book addresses itself to three types of reader: (1) to the botanist and physiologist with a discussion on morphology, anatomy, floral biology and the role of latex formation in the metabolism of the plant; (2) to the grower and breeder with detailed descriptions of the cultural requirements of individual rubber and gutta-percha plants followed by remarks on selection; and (3) to the chemist and technician with three chapters on the determination, chemistry and extraction of rubber in different species. Author and subject indexes and a list of periodicals in German translation with the original Russian titles, as well as numerous tables, diagrams and illustrations, add to the value of this first comprehensive monograph, which may well be destined to stimulate further research on the physiology of rubber plants and the techniques of rubber processing under the not so arduous conditions of temperate laboratories. V.H.G.

Reports.

(*See also* 3148.)

4103. Agricultural Improvement Council.
Second report of the Agricultural Improvement Council for England and Wales, 1950, pp. 26, H.M. Stationery Office, 1s.

The aims of the Council are to ensure the application of the results of research to agriculture, to ascertain the needs of agriculture and to translate agricultural problems into research projects. In the first part of this report an account is given of the way in which these aims are being carried out. The second part deals individually with some of the problems considered by the Council. These include problems of potato eelworm and blight control, weed control, frost damage in orchards, and diseases and pests of horticultural crops.

4104. Amsterdam, Royal Institute for the Tropics.
Inlichtingen en onderzoekingen van de Afdeling Tropische Producten in 1950. **(Information and research from the Tropical Products Department, 1950.)** [English summary 8 pp.] 1951, pp. 52, illus., Fl. 3.

A comparison of the main constituents of citronelle oil from Ceylon and Java showed that the oils differed both in composition and odour. A method of shipping copra in bulk without the use of bags is described. The damage caused by bruchid beetles in shipments of the fat-containing fruits of *Maximiliana* and *Acrocomia* palms was estimated at 26% and over 50% respectively. A method of determining the amount of carrier in

derris dusts is described. Impurities found in tea dust obtained from Java proved to be mineral substances with magnetic properties that came from the soil. The production, utilization and quality of citrus fruit in Surinam are briefly reviewed.

4105. AUSTRALIA.
Twenty-sixth Annual Report of the Commonwealth Dried Fruit Control Board for year 1949-50, Melbourne, 1950, pp. 19.
Almost entirely concerned with currants, sultanas and lexias, their world production and trade as affecting Australia.

4106. VAN HELL, W. F. (A.V.R.O.S.).
Verslag over het Algemeen Proefstation der A.V.R.O.S. over de jaren 1941-1947 en over het jaar 1948. **(Report of the General Research Station of A.V.R.O.S. for the years 1941-1947 and for the year 1948.)** *Meded. alg. Proefstat. A.V.R.O.S. alg. Ser.* **62,** [undated, received 1951], pp. 52.
As many of the records of work carried out during the war have been lost, this report is not complete. Reference is made to work on the selection of rubber, tapping systems, white root rot control, preparation of rubber and a method of analysing latex. In 1948 selection of rubber and oil palms continued, and the problems of ringed trees and tapping wound diseases in rubber plantations were studied.

4107. LABORATORIO SPERIMENTALE DI PATOLOGIA VEGETALE, BOLOGNA.
Rassegna dei principali casi fitopatologici osservati nel 1950. **(A review of the chief plant diseases observed [in Italy] in 1950.)** [*Publ.*] *Ist. Patol. veg. Univ. Bologna,* 1951, pp. 19.
This report mentions diseases of vine, olive, apple, pear, peach, apricot, plum, cherry, lemon, ornamentals and vegetables.

4108. "DE PROEFTUIN" TE BOSKOOP.
Jaarboek uitgegeven door de Vereniging "De Proeftuin" te Boskoop, 1950. **(Yearbook of the Society "De Proeftuin" [The Trial Garden], Boskoop, 1950),** pp. 104, illus.
The section on experimental work includes reports on the following: control of verticillium wilt in *Rosa rugosa* rootstocks, leaf spot on *Daphne mezereum, Stephanitis rhododendri* on rhododendrons and *Nopoiulus venustus* on lily bulbs; a determination of the optimum pH for the growth of ornamental trees and shrubs; a manurial trial with *Buxus sempervirens*; propagation trials with apple and plum rootstocks, gooseberries and ornamental trees and shrubs, using growth substances and various rooting media; experiments in walnut grafting; breeding and selection of shrubs; rose rootstock trials; an economic study of the value of an electrically heated propagating frame; artificial illumination of rhododendron cuttings; wax and paraffin treatment of rose cuttings; hormone sprays to improve berry set on holly; and treatment of roses with growth substances, agermine and reposine, to prolong dormancy.

4109. BRITISH COLUMBIA.
45th Annual Report of the Department of Agriculture, British Columbia, 1950, 1951, pp. 207.
The following branch reports are of horticultural interest. *Agricultural statistics.* Weather conditions and some production figures for fruit and vegetables are recorded. *Plant pathology.* Notes are given on incidence of the more important plant diseases in the Province. It has been demonstrated that black-knot disease of plums and prunes can be kept under control by early spring spraying of 1-10 lime-sulphur combined with the pruning out of all knots. Observations were made on the varietal resistance of some top and soft fruit to winter injury. *Field crops.* Weed control trials are summarized. *Horticulture.* Trials with the new rust-resistant blackcurrant varieties, Crusader and Coronet, have shown that these are very susceptible to mildew and require a pollinator. Work is reported on hardy seedling apricots, hardy intermediate apple stocks, sawdust mulches for soft fruit, fertilizers for Italian prunes, and chemical thinning of apple blossom. Fireblight infection of Bartlett pears was reduced by half by 3 sprays of bordeaux or DNC, but Ferbam increased the susceptibility of the trees to blight. Promising results were obtained with petal-fall sprays of parathion for control of San José scale. Excellent control of Willamette mite was obtained with Aramite and Karathane, although the latter caused some fruit burn on Winter Banana. Results of preliminary experiments indicate that ZIP is a satisfactory deer repellent. None of the 10 mice repellents tested gave commercially satisfactory results.

4110. SALTER, R. M. (BUREAU OF PLANT INDUSTRY).
Report of the Chief of the Bureau of Plant Industry, Soils and Agricultural Engineering.
Rep. Administ. agric. Res. U.S. Dep. Agric. 1950, 1951, pp. 135.
Amongst the many research projects reported the following are of horticultural interest: *Sugar cane:* New varieties have been released; weed suppression through early growing cane and control by 2,4-D is reported; progress was made in breeding upright growing cane to facilitate mechanical harvesting. *Rubber plants:* Fermate was found to be the most effective fungicide in controlling infection by a *Diplodia* sp. on the bud patch of rubber trees in Mexico; tapping trials were conducted on experimental plantings of hevea; the breeding and improvement programme for guayule has progressed. *Tobacco:* New disease-resistant varieties have been released; crop rotation studies for root disease control are in progress; biochemical changes in tobacco during flue curing are noted. *Fruit crops:* Elgetol was found effective against apple scab, as also for chemical thinning of apples; a giant apple sport from a Delicious tree has been shown to be a true-breeding tetraploid; a new peach rootstock, S-37, was found resistant to nematodes; hardy apple intermediate stocks and mazzard cherry rootstocks were tested; grape, strawberry, blueberry, cranberry and blackberry introductions were made; "little cherry" was found to be caused by the virus that causes western X-disease of peach; new materials were found effective for the control of walnut blight;

methods of ripening pears are discussed, and improved methods for precooling fruits and vegetables were worked out; 2,4-D applied at the rate of 25 and 50 p.p.m. reduced drop of pineapple oranges in Florida; the existence of distinct strains of the tristeza virus was established; Valencia oranges were held for 3 to 4 months in good condition at 32° F.; a new tung variety has been released and fertilizer experiments with tung were conducted; successful disease and temperature control was found for banana shipments. *Vegetables:* Snap bean, onion and watermelon releases were made; progress is reported in breeding disease-resistant potatoes and tomatoes; immunity from potato virus A and from virulent races of late blight was discovered; 2,4-D was used to improve the red skin colour of Red McClure; early harvesting and top killing reduced the virus incidence in seed potatoes; improvements were made in methods of growing carrot and onion seed; protein supplements increased mushroom yields. *Ornamentals:* Progress is reported with tetraploid lilies; cineraria was found to be a quick-responding test plant for the detection of chrysanthemum stunt; growing gladioli at low nutrition levels appeared to be unfavourable to disease development; curing temperatures affected bulbous iris and narcissus forcing; the dieback disease of azaleas was shown to be caused by the fungus *Glomerella cingulata*. *Miscellaneous crops:* Yields and quality of hops were studied; progress is reported in the development of wilt resistant peppermint; trials were conducted with canaigre (*Rumex hymenosepalus*) and sumac (*Rhus* sp.), both used for tanning; research on new castor-bean varieties suitable for mechanical harvesting has progressed. *Growth substances:* Of 539 compounds tested 100 gave varying plant responses; growth regulators were used in lima bean breeding; the absorption of radioactively tagged 2,4-D in beans was studied; 2,4-D induced rooting of gardenia cuttings; seed germination was not aided by radioactive treatment. *Agricultural engineering:* Studies are reported on a small apple grader for orchard use and on machines for pest, disease and weed control, for fertilizer placement, for harvesting potatoes, sweet potatoes, sugar cane and tung.

4111. COLORADO-WYOMING (RODECK, H. G., Editor).
Abstracts of Papers presented at 21st Annual Meeting of the Colorado-Wyoming Academy of Science 1950.
J. Colo-Wyo. Acad. Sci., 1950, **4**: 2: 17-84.

The following abstracts in the *Plant Science Section* (pp. 52-63) are of horticultural interest: The effects of shale oil on plant growth and development; studies of potato seed-piece rot; streptomycin for potato ring rot control; antibiotics alone and in combination for the control of bacterial blight of beans; studies on bean rot in northern Wyoming; seed-borne red node of pinto beans; preliminary studies of the effects of temperature and moisture on red node symptoms of beans; the fungi causing purple blotch of onions; root transmission of the carnation mosaic virus; the carnation as a carrier of wilt-producing fusaria; selectivity of pentachlorophenoxyacetic acid against *Streptomyces scabies*; a cumulative fluorescent chemical found in certain plants (tobacco and others) treated with 2,4-D identified as scopoletin (6-methoxy-7-hydroxy 1 : 2 benzo-pyrone); intensification of red skin colour in Red McClure potatoes by use of the sodium salt of 2,4-D; results of 4 years' treatment of Canada thistle and Russian knapweed with 2,4-D; spring *versus* spring and fall treatment of whiteweed and bindweed with 2,4-D.

4112. CONGRÈS POMOLOGIQUE DE FRANCE.
81me Session Congrès Pomologique de France, Paris, 12 au 15 Octobre 1950. **(The 81st session of the Pomological Congress of France, Paris, 12-15 October, 1950.)**
Suppl. Pomol. franç., 1950, pp. 208, bibls., iiius.

Papers presented at the Congress are mainly reviews by specialists of specialized problems of fruit production in France. They include papers on different aspects of the fruit industry, the ecological bases of apple culture, nutrient deficiencies of apple trees, storage diseases of apples and pears, fertility and pollination problems, virus diseases of fruit trees and the sinuate pear tree borer. [For the last, see 3428.]

4113. CORNELL.
63rd Annual Report Cornell University Agricultural Experiment Station for the year 1949-50, 1951, pp. 81-192.

Among the many aspects of agricultural research reported, the following are of interest to horticulturists: *Agricultural engineering:* Mechanical equipment for insect, disease and weed control. *Entomology:* Toxicity of commercial fruit tree sprays to bees. *Floriculture and ornamental horticulture:* Selection and maintenance of disease-free stocks; control of quack grass in cleared nurseries; temperature studies on woody and perennial ornamentals; production of volatiles by flowers; storage studies on cut flowers; prolonging dormancy in nursery stock. *Plant breeding:* Cytogenetic studies on *Nicotiana*; breeding high quality, insect- and disease-resistant potatoes; bean breeding. *Plant pathology:* Disease control in glasshouse ornamentals; golden nematode disease of potatoes; diseases of muckland vegetable crops; x-disease of stone fruits; machinery for the application of sprays and dusts to fruit trees; apple scab control. *Pomology:* Relationships between soil and leaf analysis as a guide to orchard fertilization; nitrogen fertilization of fruit trees with foliage sprays; storage studies; the use of chemicals for fruit thinning and for retarding fruit drop; fluctuation in the cold resistance of peach flower buds. *Vegetables:* Fertilizer requirements of vegetables; factors affecting the composition and quality of potatoes; studies on blackening of potato tubers; irrigation trials; weed control; onion breeding; nutrition studies with vegetables under controlled conditions.

4114. C.P.V. EXPERIMENT STATION. INDONESIA.
Beknopt Jaarverslag van het C.P.V.-Proefstation over 1949. **(Summarized* Annual Report of the C.P.V. Experiment Station for 1949.)**
Bergcultures, 1950, **19**: 341-9, 359-67, 370-5.

As a result of the political situation in Indonesia and of the urgent need for restoring the productivity of the plantations, the activities of the research stations have been mainly directed to extension work. *Agricultural Department of Central and East Java.* Breeding and

* The full report was issued only in mimeograph.

selection work was continued with tobacco, coffee, rubber and cacao. *Agricultural Department of West Java and South and West Sumatra.* Rubber: Vigorous clones were found to be stronger and more productive on vigorous rootstocks than on weak ones; weak clones were also more productive on vigorous rootstocks but the stock had no effect on their vigour. Specific stock/scion effects are recorded. In breeding work the best parent clones were found to be Tjir 1, PR 107, Djas 1, War 1, and BR 2. Recommended clonal material and selected seedlings yielded equally well. Clones BD 5 and Tjir 16 proved very susceptible to mildew. Trees planted at the rate of 500 per ha. yielded in their 9th and 10th year 22% and 41% respectively more than trees thinned on the Tengwall system. The effects of 2 tapping systems are compared. Tea: Vegetative propagation by cuttings has proved possible on a small scale. Blister blight appeared for the first time on the east coast of Java. DDT gave good control of *Helopeltis*, and other insecticides are being tested. *Heterodera marioni* did not infest tap roots of bushes more than 3 months old. Without food, the eelworms could only remain alive in the ground for 3 months. Fertilizer and shade trials are reported. Cinchona: Selection work and manurial and thinning trials were continued. The germination capacity of the seed was found to be greater in the wet season than in the dry season. Cacao: Propagation by means of internodal cuttings was investigated. The female of a species of *Forcipomyia* proved to be the natural pollinating agent of cacao. *The Central Chemical Technology Department of the C.P.V. Experiment Station.* Work on rubber and tea preparation is reported.

4115. East Africa.
Annual Report East African Agriculture and Forestry Research Organisation, 1950, Zenith Printing Works, Nairobi, 1951, pp. 57.

The following research work is reported: *Cloves.* From the results of surveys in Pemba in 1948 and 1950 it is estimated that, if the present rate of progress of sudden-death disease is maintained, half the stand of trees will have died in 15-20 years' time. The cause of sudden-death is still unknown. Insect transmission experiments and transmission by grafting have given no positive results. Root grafting has failed. A survey of insects feeding on the clove tree has been made. *Sweet potatoes.* A fertilizer experiment in Bugishu, Uganda, on sweet potatoes was included in a comprehensive series of fertilizer experiments on field crops. Nitrogen increased the yield of tops but not of roots. *Sisal.* In the analysis of soil taken from a long-term sisal experiment at Ngomeni, N treatments were found to have lowered the available phosphate, and N alone depleted the exchangeable potash. There was less exchangeable calcium in the N than in the P plots, and less N in the N plots than in plots fertilized with P, NP and KP. The pH was lower in NP and NK plots than in the P, PK and PCa plots. C.W.S.H.

4116. Friesdorf (Möhring, H. K.).
XXII. Tätigkeitsbericht der Gärtnerischen Versuchsanstalt zu Friesdorf/Bad Godesberg. **(22nd Annual Report of the Horticultural Research Station of Friesdorf, Godesberg),** Germany, 1950 (?), pp. 92.

(1) Among the flower variety trials reported the detailed survey of *Primula obconica* varieties takes first place. Tests were also carried out with varieties of geranium, *Begonia semperflorens*, daisy and pansy. (2) Ten English tomato varieties did not give such a heavy early crop as did Bonner Beste. Two strains of the latter were successfully selected, (*a*) for earliness, and (*b*) for heavy cropping. (3) The propagation of potatoes by sprouts, which are treated as cuttings and transplanted into pots, did not present any difficulty, and yields of the varieties Bintje and Bona were very satisfactory, as the sprouted tubers can still be used for seed, but the expense of the method justifies its application only in the case of scarcity or as a means of propagating a new variety. (4) Yields of certain cut flowers are tabulated. (5) The use of town waste proved beneficial —in terms of yield and financial returns—(*a*) for hotbeds (lettuce), (*b*) in place of peat pots (celeriac) and (*c*) as an admixture to potting soil (flowers). Origin and particle size (i.e. the degree of sifting) of the material were found to have a marked effect on organic and nitrogen content. (6) The cost of producing 2,000 cyclamen plants in 1947/48 is worked out in detail and the economics of belladonna, valerian and fennel production are discussed. Data on the effect of manuring belladonna and valerian upon yield and quality are tabulated. (7) The control of the apple blossom weevil by Nexen, a BHC preparation, was superior to that obtained with Gesarol (DDT). (8) Several years' counts carried out on a Laxton Superb spindle bush apple tree showed that, on the average, 10–12% of the flowers develop into fruit. (9) In view of the scarcity of horse manure, electric air heating was tested and found to be profitable in hotbeds. In addition, electric soil heating is recommended for radishes but not for lettuce. Another experiment showed that heating by electric cable is useful in lilac forcing. In both cases the economics of the use of electricity are worked out in detail. (10) The high price of clay pots led to the manufacture of pots from wood shavings. Sage and petunia plants raised in these pots were found to develop much more quickly than plants in clay or soil pots. On the other hand, they took up nearly twice as much room as soil pots. (11) The report concludes with a discussion of 10 years' meteorological records and of phenological observations and data concerning the start of blossoming in many apple varieties during the periods 1935-1939 and 1947-1949.

4117. The Fruit-Grower.
The Fruit-Grower Year Book 1951.
Benn Bros., Fleet St., London, pp. 162, 10s. 6d.

Some useful revisions and additions have been made this year. The tables of horticultural acreages include analysed fruit acreages county by county; the section on pest and disease control includes a list of products approved under the Ministry's voluntary scheme; and the lists of Advisory Services and Agricultural Committees have been extended to include Scotland. Among the new sections are *A quick guide to planting* dealing with fruit, vegetables and flowers, details of *Recommended fruit and vegetable grades*, and information on *Horticultural training establishments.* An excellent reference book.

4118. GRONINGEN (LANDBOUWORGANISATIE T.N.O.).
Kort Verslag van het Landbouwproefstation en Bodemkundig Instituut, T.N.O., Groningen, over 1949. **(Short report of the Agricultural Research Station and Soil Science Institute T.N.O. Groningen, for 1949),** pp. 39.

The work reported is mainly concerned with soils and manures and their effect on agricultural crops and potatoes. In a study of Mn toxicity, brown beans were found to be among the susceptible crops and potatoes, tobacco and strawberries among the unsusceptible ones. The biochemical and physiological importance of amino acids in potatoes was investigated, and the tyrosine-tyrosinase system was found to play a role in respiration. The causal organisms of footrot and fusarium wilt of peas and factors influencing infection were studied.

4119. ILLINOIS.
Progress in solving farm problems of Illinois.
Nine-Year Report Illinois Agricultural Experiment Station, for July 1938-June 1947, Urbana, 1948, pp. 287, illus. [received 1951].

The following items are selected from this report: *Entomology:* DDT was found to control potato leaf hoppers, flea beetles and colorado beetles on potatoes, cabbage caterpillars, onion thrips, squash borers and a number of greenhouse pests; rotenone was most effective against pea aphids; control studies are reported on apple and peach insects. *Horticulture:* Biennial bearing, top-grafting on frost-resistant rootstocks and harvest sprays were investigated on apples; chemical analyses and colour measurements by a spectrophotometer gave improved measures of maturity and quality in apples and peaches; new small fruit and nut varieties are listed. Studies were conducted on roses, carnations, snapdragons, gardenias and peonies. New, improved vegetable varieties were introduced; Stoddard Solvent provided an inexpensive and effective means of controlling weeds in carrots and parsnips. New fungicides improved disease control in fruits and vegetables. Strawberry varieties found resistant to root rot (*Phytophthora fragariae*) in Britain proved unsatisfactory under Illinois conditions. Antibiotic studies conducted since 1942 have opened new fields for disease control.

4120. ILLINOIS.
Progress in solving farm problems of Illinois.
61st Annual Report Illinois Agricultural Experiment Station for year ending June 1948, Urbana, 1950, pp. 224, illus.

The undermentioned projects are amongst many others briefly reported: *Entomology:* Control of onion thrips, squash borers and cabbage caperpillars; the use of DDT in apple orchards; peach insect control; the effectiveness of sodium selenate against aphids, mealybugs and two-spotted mites on chrysanthemums; control of two-spotted mite by organic phosphates. *Horticulture:* Studies on ornamentals; scab resistance of apple seedlings; development of brown rot, study of bacterial spot and root and crown rot of peaches; new fungicides to control apple, peach and tomato diseases; advances in producing antibiotics for disease control; earlier harvesting of potatoes by destruction of haulms; vegetable variety trials; phosphorus-fertility relationships for tomato soils.

4121. ILLINOIS.
Report of Illinois Agricultural Experiment Station for July 1948-June 1950, Urbana, 1951, pp. 104.

Horticulture: Brief statements from the floriculture, plant breeding, plant pathology, pomology and vegetable crops divisions are followed by a list of research projects carried out during the biennium and summaries of post graduate students' theses submitted during the same period. *Entomology:* The list of research projects includes studies on horticultural pests.

4122. INDIA.
Annual Report of the Indian Council of Agricultural Research for 1949-50, Govt. of India Press, New Delhi, 1951, pp. 81, 2 annas.

The following research work is reported: *Fruit.* An outline is given of research schemes which are to be started on the effect of growth-promoting substances on root-growth, parthenocarpy and fruit drop, the effect of synthetic chemicals on fruit drop, and the manuring of citrus fruits. Numerous other lines of investigation are mentioned, including work on banana selection and propagation, and on mango necrosis. In Assam the Khasi orange has proved the highest yielding of a number of oranges under trial. Work on the description of varieties of fruit has continued. Descriptions of 177 mango varieties were recorded. *Vegetables.* Research schemes on root crops have been started. In experiments on the storage of potatoes, coverings of sand and garlic, or sand and chillies, gave protection against pests and diseases. The best protection was obtained by treatment with DDT and storage on *machan.* Mud floors were found satisfactory. Irrigated potatoes showed least rot.

C.W.S.H.

4123. I.N.E.A.C.
Rapport annuel pour l'exercice 1949. **(Report of the work of I.N.E.A.C. stations, 1949.)**
Institut national pour l'étude agronomique du Congo Belge, Brussels, 1950, pp. 306, 150 fr.

The following items are contained in the report of the Research Centre, Yangambi. *Division of Plant Physiology.* Studies on the transpiration of oil palm, coffee and cacao trees, and on the mineral nutrition of oil palms and cacao. *Division of Phytopathology and Entomology.* Experiments on the control of *Rigidoporus microporus* on hevea and *Armillaria mellea* on oil palms. *Agricultural Research Section. Oil palms:* breeding and selection work, spacing and intercropping trials. *Hevea:* clonal selection work, thinning trials, a study of the reciprocal influence of rootstock and scion, intercropping trials with coffee, observations on the susceptibility of various clones to brown bast and breakage, and grafting experiments. *Coffee:* selection work, pruning, shading and manurial trials. *Cacao:* selection work, a comparison of the performance of trees planted on burnt and unburnt forest land and of the effect of different spacings on yield. *Other food crops:* Selection work on yams, sweet potatoes and bananas. The reports of the substations summarize

experiments on oil palms, hevea, cacao, coffee, cinchona, tung, pyrethrum, bananas, citrus, sisal, *Urena lobata* and other crops.

4124. I.R.S.I.A. Belgium.
Rapport Annuel de l'Institut pour Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture, Exercice 1950. **(Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture, 1950).**
I.R.S.I.A. Brussels, [undated], pp. 164.
In this administrative report the research programmes subsidized by the Institute are summarized. These include investigations on soils, fruit production, medicinal plants, mushrooms and strawberries.

4125. Kenya.
Precis of the Annual Report for 1950 of the Senior Agricultural Officer (Pyrethrum), 1951, pp. 4. [Typescript.]
Plant Breeding: The aim of obtaining higher yields of pyrethrins per acre is complicated by the significant negative correlation that has been shown to exist between yield of flowers and pyrethrins content. Different strains are, however, being bred and tested at 5 stations ranging in altitude from 6,300 to 9,000 ft. A new cross, 127×481, shows considerable promise for high altitudes. The clones 188 and 214, raised vegetatively, have been established in 4 isolated seed fields to produce seed of this outstanding low and medium altitude cross. Trials with colchicine as a seed treatment did not give satisfactory results. *Bud disease* (*Ramularia bellunensis*): Negative results were obtained with 6 sprays in 2 trials and in a weeding trial, and it would appear that the most promising means of control lies in the selection or breeding of resistant plants. Clones selected for resistance in 1946 have maintained this character. *Stripping trial:* Stripping gave lower yields and proved uneconomic as compared with the ordinary selective picking of mature flowers. The difference was, however, much less than had been expected, and this was found to be due to the abnormally high pyrethrins content in the immature flowers of the strain used, 14×24, a peculiarity shared only by one of the parent clones, 24. *Rotation trials:* No difference in yield occurred in the first season between pyrethrum planted after a 3-year grass ley or after a 3-year pyrethrum crop. *Oxidase and pyrethrins contents:* No clear evidence was obtained to support a suggestion from Tanganyika that an association existed between the oxidase content of pyrethrum flowers and their pyrethrins content. *Spacing trials:* No significant differences in yield were obtained in 2 further trials designed to compare standard double row spacing giving 21,780 plants per acre with triple row spacing giving 26,136 plants per acre. *Pyrethrins content and rainfall:* A relationship would appear to exist between rainfall and pyrethrins content at periods when the monthly rainfalls range from about 1 to 4 in.

4126. Kenya (Nichols, A. F.).
Precis of the Annual Report of the Agricultural Officer in Charge, High Level Sisal Research Station, Thika, for 1950, 1951, p. 1. [Typescript.]
Cutting trial: In this trial started in 1941 and now nearing completion it has been shown that a light cut gives significantly higher yields of line fibre than a heavy cut and that an early first cut is significantly better than later cuts. *Spacing trial:* In this trial, also started in 1941 and now nearing completion, 8 different spacings giving populations ranging from 726 to 2,178 plants per acre were compared. Progressive increases in yield have been obtained to date from 4·24 tons of fibre per acre for the lowest population to 11·3 tons for the highest population. Double row spacing of 13 ft. ×3 ft.×2 ft. 9 in. is now recommended for estate practice in Kenya. *Nursery trials:* There was a marked response to the use of fresh sisal waste as a mulch in a bulbil nursery, and also to sisal waste compost applied at a rate of 18 tons per acre in combination with 300 lb. sulphate of ammonia. *Trials in progress* include a manurial trial with NPKCa and fresh sisal waste, two experiments aimed at controlling the deficiency diseases "banding disease" and "leaf tip dieback", five external trials to study the behaviour of sisal under different climatic conditions and with different spacing and cutting treatments, trials with different types of planting material, and a cultivation trial.

4127. Klosterneuburg (Planckh, E.).
Höhere Bundeslehr- und Versuchsanst. f. Wein-, Obst- u. Gartenbau, Klosterneuburg, Jahresbericht 1945-1950. **(Report of the Horticultural College and Research Station, Klosterneuburg, Austria, for 1945-1950),** 1950, pp. 90.
Five years of reconstruction is the subtitle of this report which appears in the Institute's 90th year. The following, among other departments, give short surveys of their activities: Viticulture, pomology and fruit utilization, fruit research station Siebenhügel, horticulture, botany and plant protection, and beekeeping.

4128. Long Ashton.
The Annual Report of the Agricultural and Horticultural Research Station Long Ashton, Bristol, 1950, pp. 217.
An introduction by the director is followed by project reports, all of which are abstracted or noted in this number of *H.A.*

4129. Malaya Department of Agriculture.
Annual Report of the Department of Agriculture for the year 1949, 1951, pp. 87, $2 or 4s. 8d.
Production figures for the past 10 years, excluding occupation years, are given and discussed for many plantation crops. Research projects and their progress are reported on the following: *Oil palm:* breeding and selection, manuring, oil content, effect of age of transplanting, inter-row cultivation, felling and disposal, diseases and pests. *Coconuts:* selection, pests. *Pineapple:* vegetative propagation, diseases, silage, canning, dehydration. *Tea:* selection for quality, sowing practice, vegetative propagation, manuring, mechanized plucking, diseases, pests, fermentation, packing tea seed. *Cacao:* Potentiality as agricultural crop, breeding and selection, vegetative propagation, interplanting, diseases, pests, fermentation. *Derris:* selection, planting. *Cashew nuts:* shelling. *Pepper:* cultivation and manuring. *Fruit trees:* selection, variety

trials of rambutan, pests, diseases. *Cloves:* pests. *Fibres:* fibre extraction and diseases of ramie, potentialities of *Hibiscus macrophyllus, H. abelmoschus, H. sabdariffa, Urena lobata* and *Sansevieria* spp. *Vegetables:* varieties, manuring, diseases, pests. *Sweet potatoes:* varieties. *Weed control:* exploratory trials on growth substance herbicides.

4130. MALAYA.
Report of the Rubber Research Institute of Malaya for the period September 1945-December 1948, Kuala Lumpur, 1950, pp. 295.

The work dealt with in this report was mainly carried out in 1947 and 1948, the end of 1945 and most of 1946 being devoted to rehabilitation. *Soils Division:* Phosphate proved to be the chief fertilizer requirement of most soils. Sodium arsenite remained the only satisfactory means of controlling lalang (*Imperata cylindrica*), other chemicals including growth regulators being ineffective. *Botanical Division:* In trials of the 10-day system of test-tapping in seedlings the correlation between test yields and regular tapping yields, although falling, remained significant, whereas in budded trees correlation was too low to be of value. Spacing experiments showed that, while the highest yield per acre was obtained from 10×10 ft., 14×14 ft. was the most economic spacing. Investigations of new strains of both seedlings and clones continued. *Pathological Division:* Control of root disease was still best effected by standard felling and poisoning of old stumps with sodium arsenate. Trials of fungicides to control mouldy rot were initiated and the performance of a number of approved and proprietary substances is given. *Chemical Division:* The constituents of latex protein hydrolysate were determined by paper chromatography. Zinc dimethyl dithiocarbamate at 0·1% concentration with 0·1% ammonia has been found a promising latex preservative. Investigations on creaming agents and coagulants are recorded.

4131. MASSACHUSETTS.
Annual Report of Massachusetts Agricultural Experiment Station for year ending June 1950, Amherst, 1950, pp. 92, being *Bull.* **459.**

The following work is briefly reported: *Botany:* Diseases caused by soil organisms and their control; control of damping-off in woody ornamentals; studies of tobacco frenching; resistance of tomatoes to leaf mould and of carnations to wilt disease; control of diseases of greenhouse crops; fungicides for apple disease control. *Entomology:* Investigations of promising insecticides; potato spraying trials; control of celery plant bug, plum curculio in apples, apple maggot, grape cane girdler, red spider on greenhouse plants and Euonymus scale. *Floriculture:* Mainly carnation studies, also tulip trials and chrysanthemum investigations. *Horticulture:* Factors influencing the growth of ornamental nursery stock; weed control. *Olericulture:* Asparagus investigations; vegetable breeding; weed control. *Pomology:* Storage investigations; influence of chemical treatments on flowering and fruiting of fruit trees; the influence of clonal rootstocks on apple varieties; blueberry and raspberry studies; weed control in fruit plantings; varietal studies. *The Cranberry Station* at East Wareham reports on pest and bogweed control, nutritional studies and breeding.

4132. METEOROLOGICAL OFFICE, AIR MINISTRY, LONDON.
British rainfall, 1943-45.
[*Publ.*] *Air Ministry, London,* **M.O.505,** 1950, pp. 278, maps, H.M. Stationery Office, 30s.

An abridged report on the distribution of rain in space and time over Great Britain and Northern Ireland, as recorded by about 5,000 observers.

4133. MISSOURI.
Research for farm and home.
Annual Report Missouri Agricultural Experiment Station 1948-49, being *Bull.* **535,** pp. 103, illus. [received 1951].

The following projects among others are discussed in this report: *Horticulture:* Factors affecting fruit setting in apples and peaches; new sprays and spraying methods for vineyards; physiology of reproduction in horticultural plants; nutrition of fruit plants and vegetables. *Botany:* Studies of *Fusarium oxysporum* f. *lycopersici* on tomato hybrids; identification of plant diseases; studies of virus diseases of stone fruits. *Entomology:* Influence of soil minerals on insects; codling moth investigation and control. *Agricultural chemistry:* Environmental factors affecting ascorbic acid content in apples and tomatoes.

4134. NAALDWIJK.
Jaarverslag van de Proefstation voor de Groenten- en Fruitteelt onder Glas te Naaldwijk, 1950. **(Annual Report of the Research Station for Fruit and Vegetable Culture under Glass, Naaldwijk, 1950),** pp. 64.

Much of the work reported here is a continuation of that summarized in the previous year's report [see *H.A.*, 20: 2165]. New investigations include leaf analyses of cauliflower; phenological observations on fruit development of grapes and tomatoes; storage temperature trials with ixias; illumination and sugar solution treatment of tomatoes, cucumbers and lettuce; drying and disinfection of tomato seed; new methods of grafting cucumbers on to *Cucurbita ficifolia*; a study of better methods of packing glasshouse fruit; and cool storage of Black Alicante grapes.

4135. NEW JERSEY.
Science and the Land, being ***71st Annual Report of the New Jersey Agricultural Experiment Station, 1949-50,*** pp. 168, illus.

Research results of interest: *Vegetables:* Snap beans and carrots showed 34% yield increase from an addition of about 5 tons of organic matter per acre. Copper fungicides applied as sprays or dusts have given the most effective control of downy mildew on lima beans, but the carbamates have also shown promise. Successful curing and storage of sweet corn are reported. The use of chlordane resulted in good onion maggot control and a better stand of onions. *Potatoes:* fertilizer, variety, pest, storage and irrigation problems are briefly dealt with. *Tree fruits:* Liming orchard soils to pH 6·5 or above may render manganese unavailable to fruit trees. Studies were conducted in sand cultures as an aid to identifying deficiencies in

orchards. The recommendation is made to use dinitro compounds (Elgetol) in the completely dormant period for aphids and to follow with oil emulsion at the green bud or pre-pink stage for European red mite on apples. For mite control on apple and peach 2 applications should be made during the summer of parathion or TEPP. Peaches grown in tests at a high N level showed a 10% increase of bacterial fruit spot. A three-year trial has shown both BHC and parathion superior to lead arsenate against curculio on peaches. *Small fruits:* No disease organism or nutrient deficiency has been found associated with the "die-back" condition of strawberries. On blueberries 2 post-blossom applications of methoxychlor sprays or dusts are recommended for the control of cranberry and cherry fruitworms and the vector of blueberry stunt. Aeroplane fertilizing of cranberries is considered both effective and economical. *Ornamentals:* Lawn studies were conducted. A number of commercial materials are listed as giving good control of the southern red mite on holly and the two-spotted spider mite on other ornamental plants. *Weed control:* Experimental Herbicide No. 1, an ethyl sulphate salt of 2,4-D, appears to give excellent control of weeds in strawberries without injuring the plants. Aero cyanamid proved an efficient herbicide in asparagus beds in a two-year trial.

4136. NEW YORK STATE.
69th Annual Report New York State Agricultural Experiment Station, 1950, 1951, pp. 51.

Brief reports are given of the progress in many projects including the following: *Entomology:* testing new chemicals for the summer spraying of apples; biology and control of squash vine borer and grape berry moth; control of (1) Mexican bean beetle and other pests of canning beans, (2) orchard mites, (3) pear midge, and (4) peach tree borer and minor pests of peaches; biology of the Japanese beetle. *Plant pathology:* economic value of a spray programme for the control of tomato leaf blights; investigation of cabbage diseases; spray schedules for disease control in grapes and of cherry leaf spot; diseases of strawberries; production and maintenance of virus-free nursery material; x-disease of stone fruits; the influence of urea foliage sprays on fruit plant diseases; peach leaf curl and brown rot control; development of new fungicides. *Pomology:* fruit breeding; dwarfing rootstocks for commercial orchards; chemical weed control in nurseries and orchards; mineral nutrition of fruit trees and blueberries. *Seed investigations:* germination testing and physiological studies; seed-borne micro-organisms; lawn grass seed mixtures; seed testing. *Vegetables:* tomato breeding, defloration, nutrition and spacing trials; irrigation and fertilizing trials; factors affecting market quality, yields, and net returns of peas for processing.

4137. NIGERIA.
Annual Report Nigeria Agricultural Department for 1949-50, Lagos, or Crown Agents for the Colonies, Millbank, Lond., 1951, pp. 92, 9d.

This consists of 7 separate reports, one for each of the three provinces and the rest specialist. The following points of interest relating to individual crops are noted: *Oil palms:* Progress reported at the research station includes improved seed germination, reduced losses in seedling nurseries thanks to watering and shading, improved-seed distribution. A breeding programme has been initiated with the immediate objective of elucidating the genetic relations between dura, tenera, pisifera and their intermediates and examining the dura × pisifera cross. Disease studies were conducted. *Cacao:* Work on varieties included the propagation of the Nigerian selection T38 and acquisition and trial of introduced varieties. Die-back caused by *Coccotrypes pygmaeus* was controlled by watering young plants in their first dry season. A marked tendency was observed towards biennial cropping. During the period under review 6×6 ft. spacing gave the highest yield on a trial plot planted in 1942. Excellent progress was made in improving the quality of cocoa. *Citrus:* A trial at Samaru, Northern Province, has shown rough lemon far superior to sour orange or acid lime as a rootstock for grapefruit, but at Ilorin sour orange still proved best. Other horticultural produce of economic importance grown in the colony includes kola, dates, fibres, ginger, sunflower, coffee, tobacco, sugar cane and vegetables.

4138. PHILIPPINES.
Annual Report Philippines Department of Agriculture and Natural Resources for year ending June 1949, Manila, 1950, pp. 78.

Progress reports are submitted on the rehabilitation of the coconut, tobacco, fibre and sugar industries, among others, and comparisons are made between pre-war and present production levels.

4139. LAWES AGRICULTURAL TRUST [ROTHAMSTED].
Report of Rothamsted Experimental Station for 1950, Harpenden, 1951, pp. 184, 7s. 6d.

Horticultural interest lies chiefly in the following: *Chemistry Department:* In a series of comparative trials silicophosphate proved to be as effective as superphosphate, on the basis of equal phosphorus, for swedes and reseeded grass, but less effective for potatoes. With potatoes planted in the furrows of ridged land side-band fertilizer applications 2 in. from the sets showed no advantage over the usual method of spreading fertilizer over the ridges before planting. Both of these methods were, however, much superior to dressings broadcast before ridging. Granular fertilizer containing 14% P_2O_5 and 14% K_2O placed to beans and peas resulted in higher yields than when broadcast. Other placement trials were conducted on carrots, kale, spinach, red beet and sugar beet. *Botany Department:* Experiments have shown that assimilation by virus-infected potato leaves is not reduced until the rolling of the leaves develops. Both Up-to-date, a tolerant potato variety, and Craig's Defiance, an intolerant one, grown at low nitrogen level showed severe symptoms of leaf-roll. Addition of nitrogen appreciably reduced the severity of symptoms in Craig's Defiance and almost suppressed it in Up-to-date. From a preliminary examination it appears that leaf-roll infection retarded the transport of dry matter from the tubers to the developing shoots of intolerant varieties, but had little effect on tolerant ones. *Statistics Department:* A survey of main crop potatoes has now completed its

third and final year and the results are to be published shortly. *Plant Pathology Department:* Attempts to transmit the cacao swollen shoot virus mechanically failed; the Rothamsted tobacco necrosis virus, however, was readily transmitted by inoculation to and from leaves of cacao. The possibility of freeing Majestic potato tubers from leaf roll by heating for 20 or more days at 37·5° C. was confirmed, and the effect shown to be permanent. Among other departmental reports is that of the Woburn experimental station. Two special reviews concern fertilizer practice in 1950, and potato root eelworm.

4140. LAWES AGRICULTURAL TRUST [ROTHAMSTED].
Results of the field experiments 1949.
[*Publ.*] *Rothamsted exp. Stat.*, [1951 ?], pp. 98, 5s.

An appendix to the Annual Report, this publication consists of summaries of layouts and tabulated results.

4141. INSTITUTO AGRONÔMICO, SÃO PAULO.
Instituto Agronômico do Estado de São Paulo. Pesquisas e trabalhos experimentais em andamento 1950. **(The Agricultural Institute of São Paulo [Brazil]. Investigations and experimental work during 1950),** 1950, pp. 155.

This report is limited to an account of the organization of the Institute and its associated experimental stations, and to a tabulation of the research projects carried out by the various technical sections and crop commissions during the year. A total of 941 projects dealing with more than 80 economic crops bears witness to the wide scope of the work. The crops covered include coffee, potatoes, sugar cane, citrus, temperate and tropical fruits, tobacco, vegetables and ornamental plants, insecticidal, medicinal and aromatic plants, oil plants, fibres, and vines. No experimental results are reported.

4142. TRELAWNEY.
Annual Report Trelawney Tobacco Research Station for 1949, being *Publ. Tobacco Research Board S. Rhodesia* **12,** 1950, pp. 87.

Crop rotations: In one 3-year and two 5-year course rotation experiments, tobacco following fallow gave the best quality leaf. It also gave the highest value per acre except in the 5-year trial on red contact sand, where the rotations containing sunn hemp outyielded the fallow. *Seed bed experiments:* Heavy applications of BHC compounds inhibited growth and distorted both very young and " tickey " sized seedlings, while lighter dressings of BHC and heavy applications of DDT caused only slight damage. *Spacing trials:* Previous findings have been confirmed and 3 ft. 6 in. × 2 ft. or 3 ft. × 2 ft. spacings are indicated as giving increased yields without appreciable loss of quality. *Variety trials:* Proved strains of popular varieties and two promising crosses raised on the station were tested. *Nutrition:* Old land and land which has been under rotational crops almost invariably responded well to compost dressings, whereas with newly cleared land response was usually not noticeable or very slight. Sand culture deficiency experiments were started. *Spray trials:* Ky-bordeaux at 4-4-50 proved significantly better than other sprays in controlling spot on leaves. Fortnightly applications were less effective than treatments every 7th or 10th day. *Soil pests:* DD did not affect either yield or quality of tobacco grown on treated plots. Two varieties reputed to be eelworm resistant were proved to be tolerant rather than resistant. Minimum dosage of DD necessary to control nematodes was found to lie between 6 c.c. and 8 c.c. per sq. ft. The application of 0·5% gammexane at the rates of 50, 100, 200 and 500 lb. per acre to control white grubs and wireworms had no apparent effect on yield or on selling value. *Control of suckering:* In preliminary trials a mixture containing 2% 2,4-D and 5% α-naphthaleneacetic acid applied to the end of the stalk after topping at the rate of about 1 g. of paste per plant gave promising control of suckering. *Turkish Tobacco Investigations:* Highest yields tended to be associated with a 150 lb. per acre application of 3N: 9P: 9K, while highest quality came from the closest spacing, i.e. 18 in. × 4 in. Of the varieties tested, the Soulook varieties and strains were the most successful, and 3 new varieties, 2 of them probably Smyrna types, were found promising.

4143. TRESSLER, D. K. (EDITOR).
Some aspects of food refrigeration and freezing.
F.A.O. agric. Study **12,** 1950, Washington, pp. 205, bibl. numerous, illus.

Papers read at the F.A.O. meeting in Copenhagen, October 1948, provide the material for this comprehensive report on food preservation by refrigeration and freezing, including fruit and vegetables, with particular reference to Europe.

4144. OFFICE OF FOREIGN AGRICULTURAL RELATIONS, U.S.D.A.
1951 Foreign Agricultural Outlook Charts.
[*Publ.*] *U.S. Dep. Agric.*, 1950, pp. 83.

These graphs and tables illustrate trends in production, exports and imports, throughout the world and in the United States in particular, of the more important agricultural commodities, including fruits, tobacco and coffee.

4145. UNITED STATES DEPARTMENT OF AGRICULTURE.
Agricultural statistics 1950.
Supt. Documents, U.S. Govt. Printing Office, Washington 25, 1950, pp. 791.

Section III includes miscellaneous figures on olive and tung oil, Section IV (pp. 170-305) figures on fruits, vegetables, tree nuts, tea, coffee and cacao. They vary as to the exact detail given with particular crops, thus figures on walnuts refer to Persian (or English) walnuts in the shell, their production, season, average price per ton received by farmers and value in California and Oregon, and foreign trade U.S.A. 1929-1940, while those for cacao refer to tonnage of export of cacao beans from the principal producing countries, averages 1935-1939 and 1940-1944, annual 1946-1949.

4146. UTAH.
Biennial Report Utah Agricultural Experiment Station 1948-50, 1950, pp. 62, being *Bull. Utah agric. Exp. Stat.* **343.**

The following are among the findings of the various research activities reported: Of 4 methods of pruning tried on young peach trees, the " long " method gave the highest yields and is considered most suitable for

Utah conditions. Apricot was found to be a symptomless carrier of western x virus of peach and of little cherry and other cherry diseases. Virus-contaminated celery refuse, sometimes harbouring aphids, was a major source of new infection. Resistance to lima bean seed rot was shown to be inherited. Zinc deficiency symptoms showed up in horticultural crops when soils were high in phosphorus.

4147. VIRGINIA.
Annual Report Virginia Agricultural Experiment Station for year ending June 1950, pp. 112, illus.

The report includes brief accounts of the following work: *Fruits and nuts:* The use of Elgetol (sodium salt of NAA) sprays for thinning apples, and of boron sprays to increase fruit set; maturity, quality, storage and insect pest studies on apples; spray residues on apples and peaches; breeding apples, peaches, cherries, grapes, raspberries and blackberries; blueberry and nut investigations; mouse control in orchards. *Tobacco:* Tobacco flea beetle, hornworm, and green June beetle control trials; black-shank-resistant and mosaic-resistant variety evaluations; flue-cured and dark-fired tobacco variety trials; bright leaf tobacco curing with forced ventilation and improved barns for air-curing; soil sterilization of plant beds; rates of fertilizer application, sidedressing and spacing of flue-cured tobacco; the effects of topping and suckering on yields and quality. *Vegetables:* Investigations of tomato late blight; seed potato production; variety trials. *Ornamentals:* Lawn studies; rodent control in bulb plantings; compost from sawdust; mulches of sawdust and shavings.

4148. WATTLE RESEARCH INSTITUTE.
Report for 1950 (3rd year) Wattle Research Institute.
Pietermaritzburg, 1951, pp. 35.

Current work is reviewed and a paper is presented on pre-sowing treatment of wattle seed.

4149. WEST VIRGINIA.
Science serves your farm, being *Biennial Report of the West Virginia Agricultural Experiment Station, 1948-50,* issued as *Bull. W. Va agric. Exp. Stat.* **342,** 1950, pp. 38.

The following experimental results, among others, are reported. Whole potato sets produced better stands than cut sets of the same size and, in an early variety (Cobbler), generally yielded better, though in a late variety (Sebago), cut sets yielded better. In trials with 18 different rootstocks and 4 apple varieties, the following combinations gave the best yields: Gallia Beauty on McIntosh seedlings, Staymared on Northern Spy seedlings, York Imperial on clone 317 and Starking on M. XV. Infra-red Michigan radiation frost protectors gave protection against 5–6° of frost within an 80 ft. radius, but were not considered economic. The use of a Vinyl resin emulsion on tomatoes at transplanting time did not increase early production. The strawberry varieties Fairlands and Vermilion showed complete or almost complete immunity to red stele disease. Progress is being made in the production of low bush × high bush hybrid blueberries. Shredded sphagnum moss proved to be a better rooting medium for blueberries than peat or peat and sand. Brooks spot of apples can be controlled by one application of 1-2-100 bordeaux, at any time from late May to early July. Fire blight on Willow Twig apples has been reduced to a minimum by canker removal. Internal bark necrosis, primarily a disease of Delicious apple trees, occurs only where the soil is acid and contains available Mn; applications of carbonate of lime or Mg assist in control.

4150. WYOMING.
59th Annual Report of the Wyoming Agricultural Experiment Station, 1948-49, Laramie, pp. 48, illus. [received 1951].

Includes short notes on potato variety trials, scab resistance, and ring-rot control; bean production and diseases; and weed control.

New periodicals.

4151. BOTANIC GARDENS, BOGOR, INDONESIA.
Annales Bogorienses [Ann. Bogor.], 1950, Vol. **1,** No. 1, pp. 52, $1.50 per number.

This journal is a continuation of the *Annals of the Botanic Gardens, Buitenzorg.* It is intended primarily for publication of results of botanical (non-taxonomical) research on tropical plants and micro-organisms. Work will be published not only from the Botanic Gardens, as previously, but also from the Universities and other scientific institutions of Indonesia. The papers are in English and the journal will appear at irregular intervals.

4152. KLOSTERNEUBURG (KRAUS, J., EDITOR).
Mitteilungen der höheren Bundeslehr- und Versuchsanstalten für Wein- Obst- und Gartenbau, Wien-Klosterneuburg und für Bienenkunde, Wien-Grinzing [Mitt. Klosterneuburg], 1951, 1 Jg., Hft 1, pp. 44, illus. 15s. a year U.K., otherwise 9.50 Swiss francs or $2 U.S.

" Mitteilungen " is the title of a new horticultural journal issued by an old Austrian friend, the " Höhere Bundeslehr- und Versuchsanstalt fur Wein-, Obst- und Gartenbau Klosterneuburg " (a horticultural institute situated at Klosterneuburg, a few miles north of Vienna). The editor stresses the importance of international exchange of views, and foreign scientists and horticulturists are invited to contribute reports on their work. The current number includes articles on the application of growth substances to the raising of grape vines, cold storage of fruit, and subsoil irrigation.

Noted.

4153.

a *Twenty-fourth Annual Report of the Australia Canned Fruit Board for year 1949-50,* Melbourne, 1950, pp. 23.
Concerns apricots, peaches, pears and pineapples.

b **Agricultural Statistics Report, British Columbia, year 1948.**
[*Publ.*] *Dep. Agric.* (*Statistics Branch*), *B.C.*, 1950 pp. 51.

c *Report of the Caribbean Commission to the Governments of the French Republic, the Kingdom of the Netherlands, the United Kingdom, the United States of America for the year 1948,* pp. 37 [received 1951].

d *Annual Report Storrs Agricultural Experiment Station, Connecticut, for year ending June 1950,* pp. 50, being *Bull.* **271.**

e DORST, J. C., AND OTHERS.
Referatum van publicaties uit de afdelingen der Landbouwhogeschool, verschenen in de cursusjaren 1947-'48 en 1948-'49. **(A bibliography [annotated] of publications issued from the departments of the Agricultural College for 1947-48 and 1948-49.)**
Meded. LandbHoogesch. Wageningen, **50**: 1950, pp. 90.

f *Report of the Edinburgh and East of Scotland College of Agriculture for the year ending 30 September 1950,* pp. 111.

g ENTOMOLOGICAL BRANCH, DIVISION OF SCIENCE SERVICES, N.S.W. DEPARTMENT OF AGRICULTURE.
Insect Pest Survey for the years ending 30th June 1948, 1949, and 1950, 1948, 1949 and 1951, pp. 30, 42 and 52, respectively.
Brief notes on fruit and vegetable pests included.

h *Annual Report Department of Agriculture, Fiji, 1949,* Suva, 1951, pp. 39.

i THE LAND SETTLEMENT ASSOCIATION LTD. **Smallholdings organized on the basis of centralised services,** being *Review for the years 1945-50* and *Accounts for 1949-50,* London, 1951, pp. 52, 1s. 9d.

j **Report on crops, livestock, etc., produced in Manitoba in 1950.**
Crop Bulletin Department of Agriculture and Immigration Manitoba **129,** 1951, pp. 56.

k *Sixty-third Annual Report Michigan Agricultural Experiment Station 1949 to 1950,* Lansing, 1950, pp. 261.

l *Thirty-fourth Annual Report of the National Research Council of Canada 1950-51,* being *N.R.C.* No. **2463,** pp. English 43, French 45.

m NATIONAL RESEARCH COUNCIL OF CANADA. *Report of the Canadian committee on food preservation for the year 1950,* pages numbered sectionally, bibls. (not for publication).

n NOBIS, F.
Die Freiland-Schmuckstauden. IV. *Echinops* bis *Kniphofia* (*Tritoma*). **(Perennials for the garden. IV. *Echinops* to *Kniphofia (Tritoma).***
Grundlagen u. Fortschritte im Garten- u. Weinbau, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1951, Heft **85/86,** 8½×6 in., pp. 194, illus., DM. 6.80.
For a short note introducing this series, see *H.A.*, 21: 1195.

o *57th, 58th, 59th and 60th Annual Reports of Washington Agricultural Experiment Station for 1946-47, 1947-48, 1948-49, and 1949-50,* Pullman, pp. 21, 21, 22, 21, being *Bull.* **501, 516, 523** and **531** respectively [received 1951].
Short administrative reports including lists of publications by the staff.

p **Research powers the farm,** being *Biennial Report of the West Virginia Agricultural Experiment Station, 1946-48,* issued as *Bull. W. Va agric. Exp. Stat.* **334,** 1948, pp. 36 [received 1951].

q *Report of the Department of Hop Research, Wye College, Kent, for 1950,* 1951, pp. 84, 4s.
See separate abstracts.